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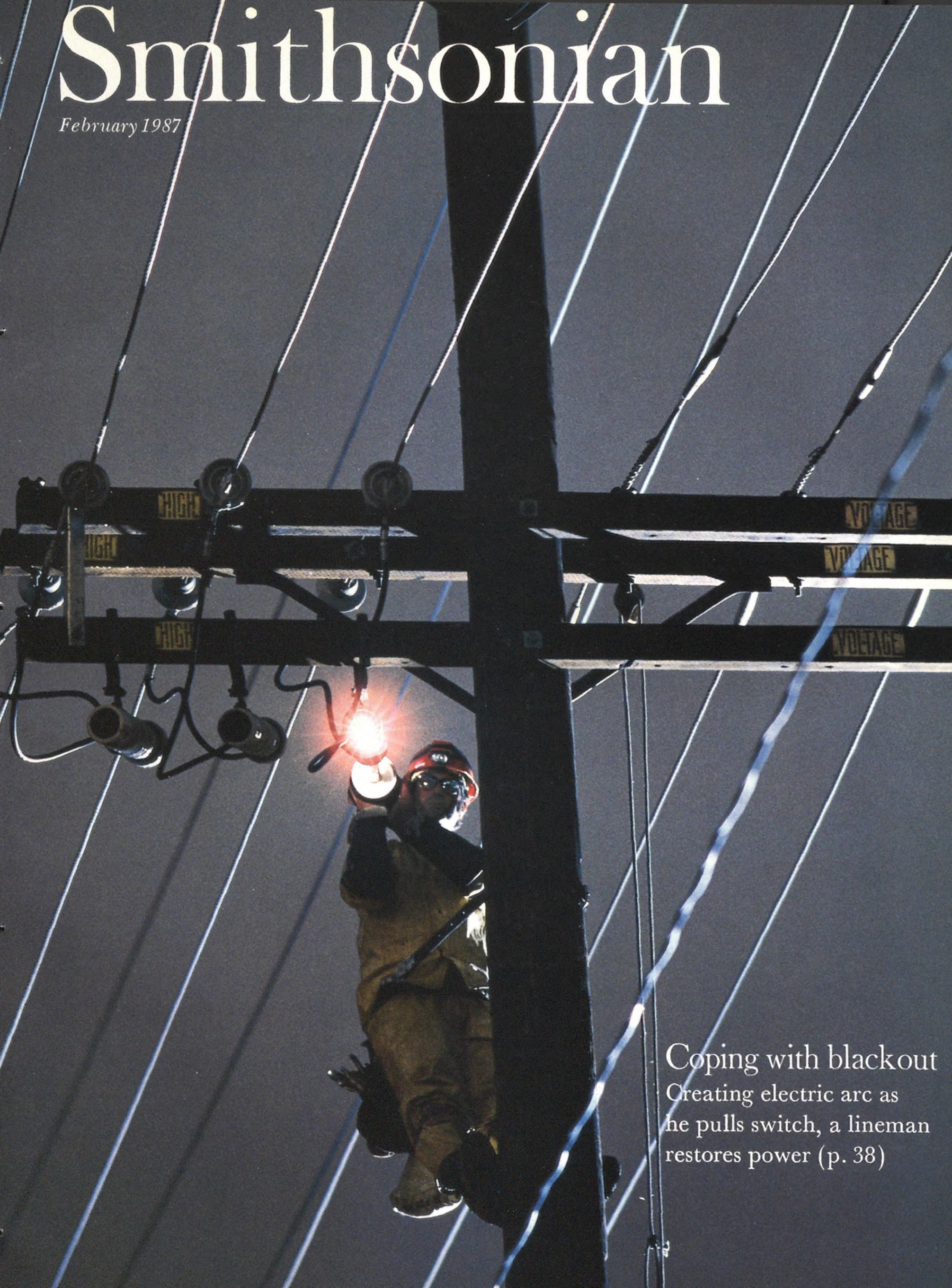

Coping with blackout

Creating electric arc as he pulls switch, a lineman restores power (p. 38)

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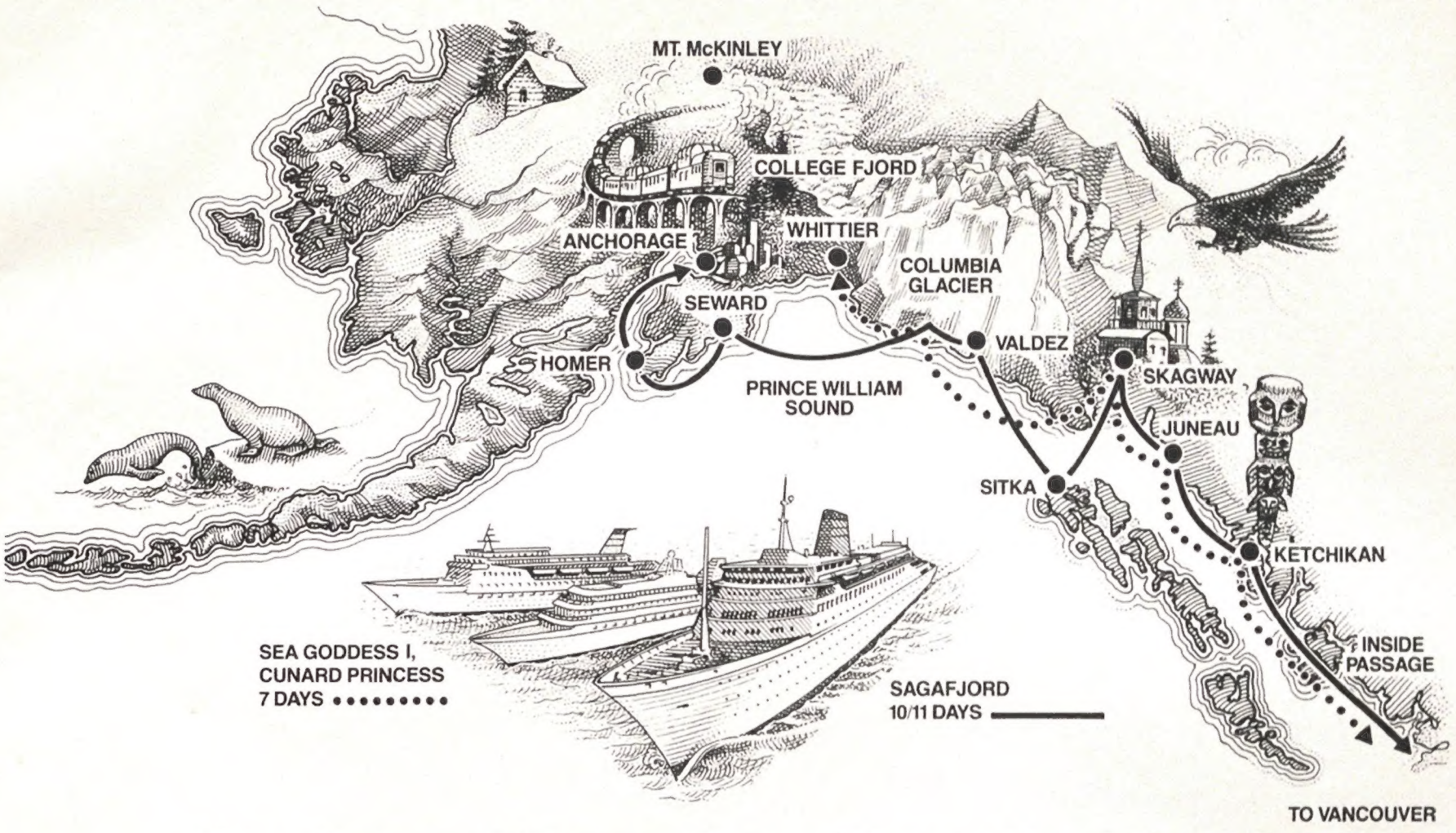

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Smithsonian

Volume 17, Number 11

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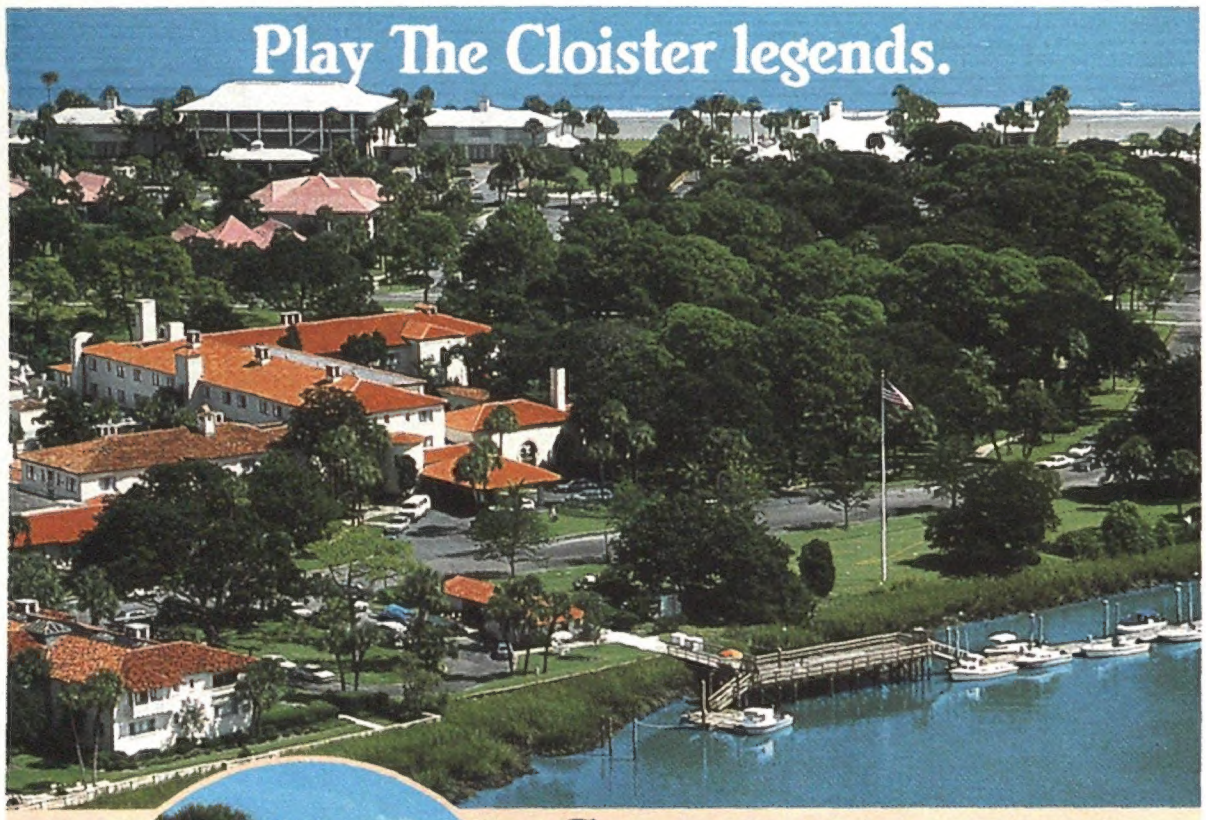

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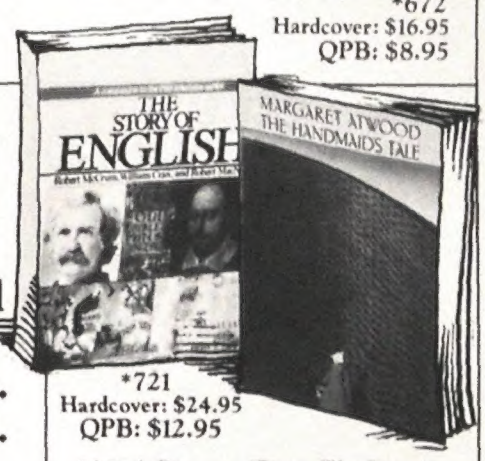

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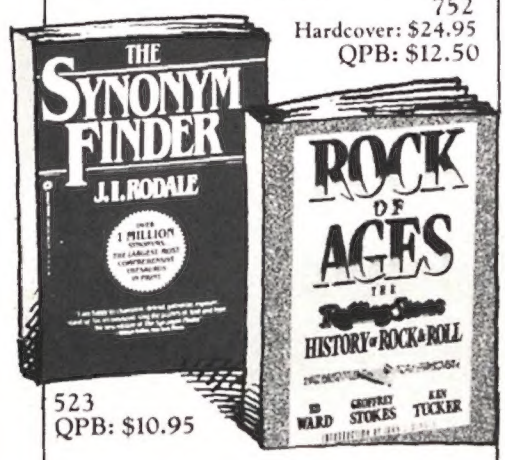

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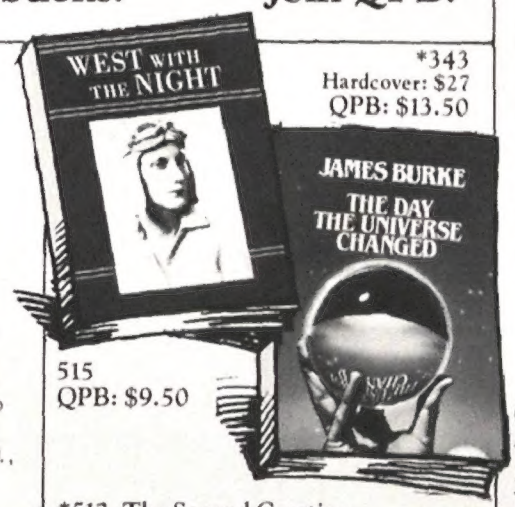

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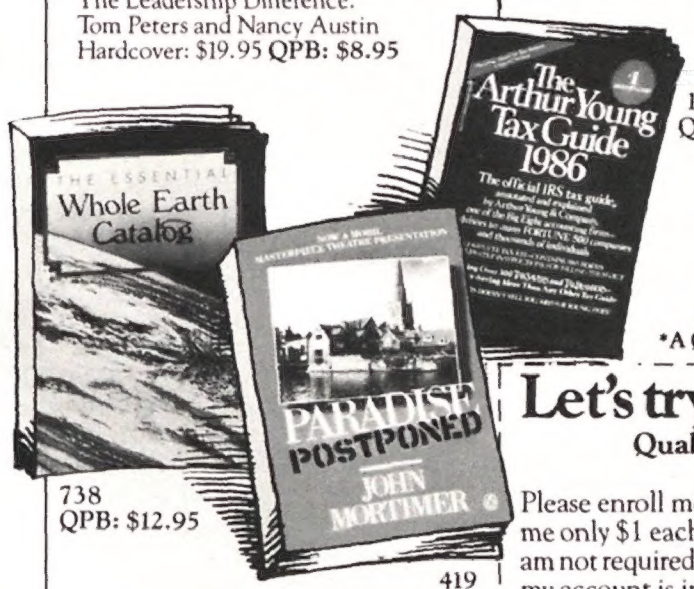

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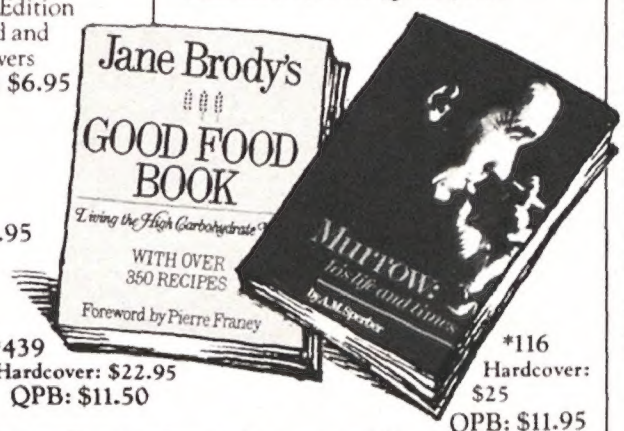

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Smithsonian horizons

Today's controversy over extinction is a healthy example of what happens when varied scientific disciplines intersect

One of the great challenges in modern science is to deal with new research problems at the intersection of many disciplines. An interesting example is furnished by the current controversy over the nature of extinction processes in the remote past, and especially over the possible instigation of some of these processes by periodic collisions of large meteors or asteroids with the Earth. What seemed a settled issue has become a subject of interdisciplinary contention. Discussions have extended beyond geologists and paleontologists to involve geophysicists, crystallographers, astronomers, astrophysicists, meteorologists, statisticians and evolutionary biologists.

A recent memoir by paleontologist David Raup on the development of this controversy is a useful introduction to the recent scientific findings (*The Nemesis Affair: A Story of the Death of Dinosaurs and the Ways of Science,* W.W. Norton, New York, 1986). But equally fascinating is the disclosure of the various ways in which science itself moves forward whenever different systems of ideas come into collision.

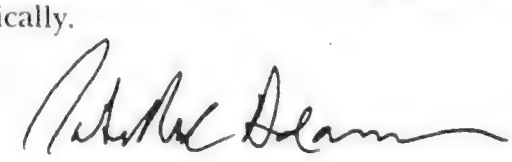
The intellectual origins of the controversy go back more than 150 years, to a geological and paleontological debate over "catastrophism" and "uniformitarianism" as alternate principles for understanding the Earth's history. Under the former of these approaches, both Earth processes and biological history were punctuated by sudden changes, while the latter implied a slower and more orderly process of change. Initially uniformitarianism carried the day. It may be said to have laid the foundations for geology as a historical science, and thence for Charles Darwin's evolutionary theories. But now the old argument rages again with something like its original vigor.

Much depends on measurements of the *rate* of geological processes and evolutionary changes in the fossil record. That rate is a composite. New species evolve over time, but only a minute proportion of them persist indefinitely. As a statistical average, Raup believes their average duration is in the one- to ten-million-year range, while our oldest fossils approach four billion years in age. Extinction, in other words, is a vital and omnipresent part of the larger process of evolution.

Two discoveries seem to have contributed most to changing the picture. First, there was an awakening awareness that known species extinctions have tended to cluster around a small number of transitional episodes in the geological record. Of special interest is the boundary between the Cretaceous and Tertiary periods, some 60 million years ago, a horizon marking the disappearance of the dinosaurs. Second, with some important inputs from another field (physics), new methods were introduced to establish the relative length of these extinction episodes. The methods involved the measurement of minute traces of iridium, an element that is exceedingly rare in the Earth's crust but more prominent in the rain of micrometeorites with which the Earth is constantly bombarded. To the surprise of investigators, application of these methods produced evidence of an "iridium anomaly," concentrations of the rare element many times above background levels, in geological sequences contemporary with the extinction of the dinosaurs.

Space does not permit me to enlarge upon the great uncertainties, complexities and collisions of scientific "paradigms" that are likely to surround this hypothesis for a long time to come. At one level, they involve whether the fossil record and existing taxonomic distinctions are adequate to support the theory, whether it is reinforced by evidence for other mass extinctions, and whether the statistical interpretation of clusterings of extinctions is sound. At another, it leads to a widening search for independent bodies of observation with which to test it: Does "shocked quartz" at the geological boundary or extinction point reinforce the case for high-velocity impacts? Might high iridium levels stem from volcanic eruptions? Are there indications in the botanical record of climatic anomalies, such as an "impact winter" (on the model of current debates over the possibility of a war-induced "nuclear winter") that airborne dust and soot might have produced? How can we exclude explanations in which climatic and sea-level changes, vegetation succession and mammalian competition, as well as the impact of an asteroid, *all* could have played a part? Finally, are there very long-term periodicities consistent with the return to the solar system of a comet (the "Nemesis" of Raup's title) on an eccentric orbit that could have displaced an asteroid onto a collision course with the Earth?

Much of the fun of science comes at the intersection of different approaches like these. Are mass extinctions the product of long, complex interactions between organisms and their environment, or of more sudden, catastrophic events? If the latter, might they have an extraterrestrial basis? If so, as Raup argues, we cannot understand the history of life without taking account of the Earth's cosmic environment. Tune in next month, or next year. Good science does not imply stability or certainty. Before long, something in this exciting picture will have to change, and change drastically.



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Letters to the Editor

Brother Angel

Dear Sir: Of particular interest to me in your December cover story was Mr. Wernick's characterization of Angelico as living in the "vertical pattern" rather than in the "horizontal" continuity of historic events.

I do not believe the vertical pattern of living is confined to medieval times. It seems to me that Flannery O'Connor, the excellent novelist and short-story writer from Georgia who died in 1964, expressed the same attitude in her writings that Fra Angelico did in his paintings. As a Christian, I think this is the way our lives should be lived in any age, including today's secular one. Flannery O'Connor helped convince me of that, and it was a great joy to have it further confirmed by the life and art of Fra Angelico.

Kenneth A. Mammel
Newtown, Pennsylvania

World's greatest detective

Dear Sir: My wife and I happened to see, at the Pitlochry Festival Theatre in Scotland in 1976, Matthew Lang's play *Sherlock's Last Case.* The plot: at long last the downtrodden Dr. Watson revolts at his years of abuse by Holmes and, in a scheme worthy of Conan Doyle, actually does away with his tormentor.

The audience, mostly English and local Scots, reacted to the finale with an aghast silence—"How could anyone have done this to our hero?" As they filed out quietly, the expressions of dismay and sadness on their faces were just as if they were leaving the funeral of a dear friend.

William Baumrucker
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One of the greatest delights of a summer day is seeing colorful butterflies fluttering from flower to flower, light as a breeze and bright as the midday sun. We're fascinated as they rest in a pretty garden displaying the intricate patterns on their lovely wings.

Famed naturalist artist Paul J. Sweany captures perhaps the most striking of all butterflies in his masterwork, "Spicebush Swallowtail." In this vibrant scene, Sweany chose to depict two of them resting on large, peach-colored roses in a misty summer garden.

"Spicebush Swallowtail" represents Sweany's first limited-edition plate. And premiere offerings by talented new plate artists can create great demand that may lead to market appreciation, after the edition is closed.

"Spicebush Swallowtail" premieres an elegant collection of eight plates entitled the *Butterfly Garden* Plate Collection. As an owner of "Spicebush Swallowtail," you will have the right—**but never the obligation**—to acquire all plates in the series.

Spicebush Swallowtail

In addition, under our **100% Buy-Back Guarantee,** you may return any plate within 30 days of receipt for a full refund, releasing your series rights for availability to another collector.

Each issue in this magnificent collection will feature a different butterfly species in a lush garden setting from an original painting by Paul J. Sweany. Each plate will be priced at just $29.50 and will be strictly limited to a 14-day firing period. Furthermore, each plate will be hand-numbered and accompanied by a Certificate of Authenticity. And you need not send any money now to reserve your plate.

This important introduction by Paul J. Sweany is expected to attract immediate attention and praise from nature lovers and collectors alike. So, to assure a priority reservation for "Spicebush Swallowtail," you should return your order form promptly!

Respond by: **February 28, 1987**

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Please accept my application for "Spicebush Swallowtail" by Paul J. Sweany. I wish to purchase _____ (1 or 2) "Spicebush Swallowtail" plate(s) at $29.50 (plus $2.14 shipping and handling) each, for a total of $_____ ($31.64* or $63.28*).

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Dear Sir: Although I do not consider myself a Sherlockian, as a student of illustration I noted with interest the significant number of meerschaum pipes evident in your photographs. Sidney Paget's original illustrations for *The Strand Magazine* show Holmes with his straight-stemmed brier (below). I believe the meerschaum was introduced to the character by Basil Rathbone.

Incidentally, Sidney was commissioned to illustrate the stories by error. *The Strand*'s editors intended to hire his brother Walter—who became the model for Holmes, presenting an image far handsomer than Conan Doyle had intended.
Gregory Lee Hricenak
Jeannette, Pennsylvania

It has never been established who introduced to the Holmes character a calabash with meerschaum bowl, now so widely identified with him. American matinee idol William Gillette, in his 1899 melodrama, Sherlock Holmes, *introduced the curved-stem brier, on the pretext that a straight pipe fouled his lines. But there was a sneaking suspicion the real reason was that a curved pipe was more flattering to the classic Gillette profile.* Ed.

Dear Sir: Fred Strebeigh neglected to mention the scion with the cleverest name of all: "The Crew of the Barque *Lone Star*" of Fort Worth, Texas.
Paula Lozar
San Jose, California

Dear Sir: Why did you describe the object to the left of the gasogene in the photograph on page 64 as a "carrying case for decanters"? Even Dr. Watson would have known it is a tantalus—a decanter for spirits that can be locked to thwart—albeit tantalize—underlings who

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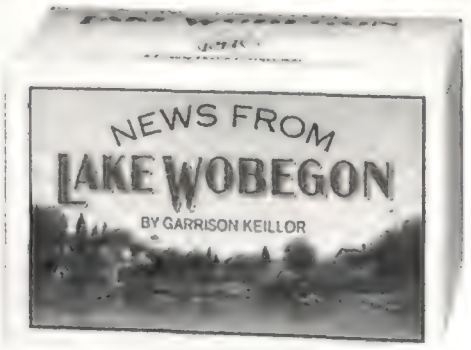

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might otherwise take little nips of the master's whisky or brandy.
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SMITHSONIAN *carried its decanters up the wrong road.* Ed.

Warm Mineral Springs

Dear Sir: As a physical anthropologist, I appreciated the photo of Colonel Royal's tactful display of human skeletal remains. What a fine example of an appreciation of the scientific value of archaeological material. A feather headdress on the skull, a pipe between the teeth and a synchronized light-and-music display would enhance this monument to sensitivity.
Richard G. Wilkinson
Burnt Hills, New York

Dear Sir: As to the stainless-steel mapping grid having "corroded to nothing," stainless steel's corrosion resistance relies on a physically adsorbed layer of oxygen on the metal surface. This oxygen gradually becomes depleted and must be renewed continuously. Therefore stainless steel in an environment lacking oxygen, such as the depths of Warm Mineral Springs, will be subject to rapid corrosion. Galvanized-steel wire like that used for making barbed wire for fencing will perform much better in the deep spring water.
H. P. Leighly jr.
Professor of Metallurgical Engineering
University of Missouri-Rolla

Pronghorn antelope

Dear Sir: A few years ago, while traveling in the West, we had to make an emergency stop off of Interstate 80 in central Wyoming. When we pulled into a tiny, dusty town some distance from the highway, we were surprised to find it completely fenced in. Every home, whether great or small, every church, every school was surrounded by a picket fence. Of course we asked the reason. We were told it was the only way to have shrubbery, trees or gardens. Unless every yard was fenced in, the antelope would eat everything!

Now I know what those antelope were like. Beautiful creatures.
Alice Holzhauer
Panama City, Florida

Gavin MacLeod on the Great Wall of China

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Origins

Dear Sir: About 25 years ago I did considerable writing for children, including an article on incense.

One of my sources showed a dramatic picture of the poor myrrh bushes being whipped violently in order to free the sap. Another claimed that frankincense was first noticed when goats, browsing on the leaves, smelled unexpectedly pleasant from the sap that was clinging to their muzzles.

Doris Arnold
Detroit

West Edmonton Mall

Dear Sir: It is worth noting that our firm, Maurice Sunderland Architecture Inc., using computer-aided design, produced over 1,000 drawings for this project. The firm is now involved in the design of a megamall in Bloomington, Minnesota—an approximately nine-million-square-foot project.

Maurice Sunderland
Calgary, Alberta

Phenomena

Dear Sir: Our son built model planes in his early years, hung them from his bedroom ceiling, dreamed and watched the big birds glide into the nearby air terminal. Then it happened: as an electrical engineer for a major industry, he found relaxation in learning to fly his own Piper Cherokee.

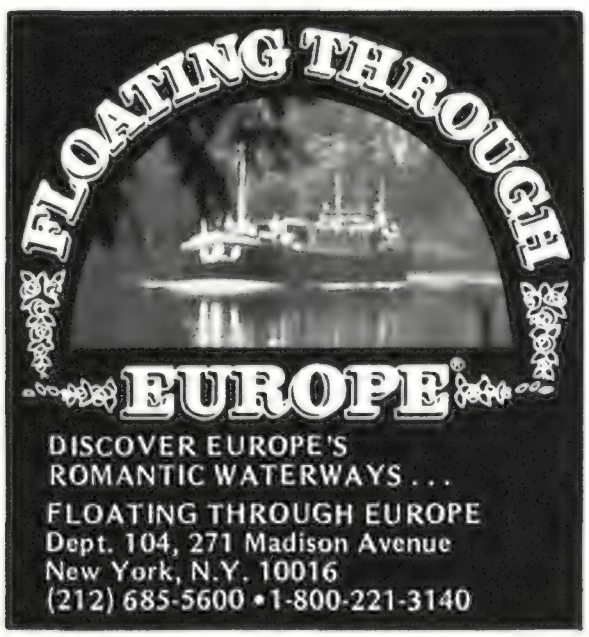
Two years ago we flew with him and his copilot wife to remote Crooked Island in the Bahamas—a pilots' fly-in vacation paradise—and so shared the unforgettable adventure and dreams of a man who was once our little boy.

Mr. and Mrs. Thomas A. Place
DeLand, Florida

Dear Sir: I would like to take issue with Mr. Wiley. For those who want to enjoy the thrill of flight, there are still a lot of "holes to bore in the sky."

I've been doing it for years, as a pilot and instructor, and grant that insurance limitations, restrictions and so on have grown. But for us well-trained semiprofessionals in general aviation, its death knell will not be sounded as long as Man wants to feel the freedom of flight. You may still hear at any airport, on the radio, any day: "Tally Ho! Traffic."

James G. B. DeMartini jr.
Foster City, California



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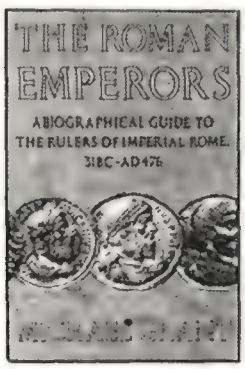

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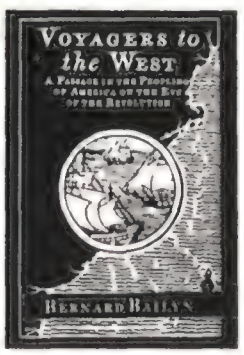

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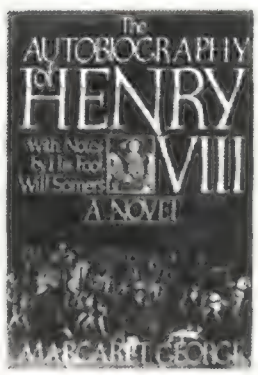

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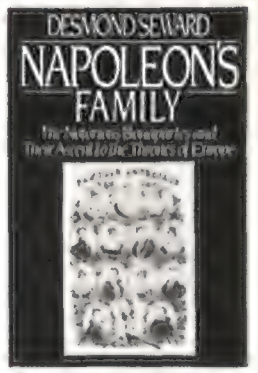

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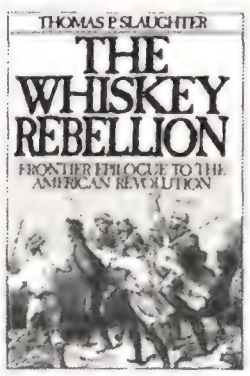

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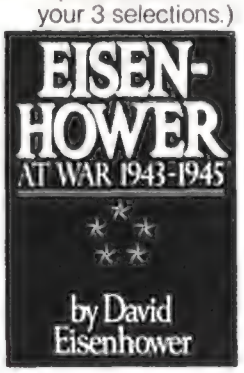

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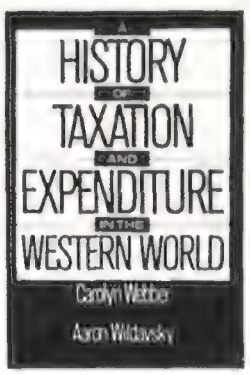

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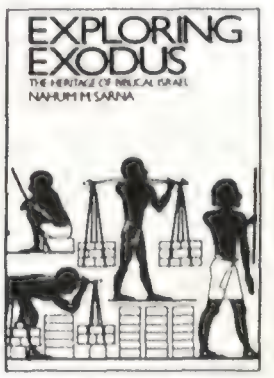

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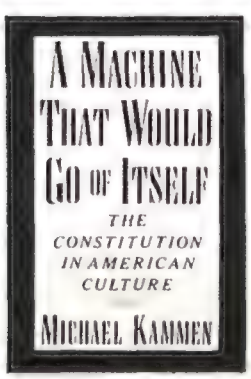

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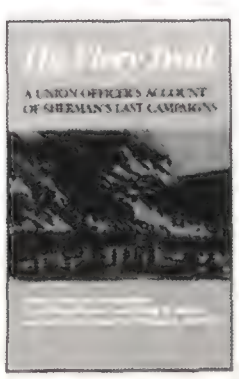

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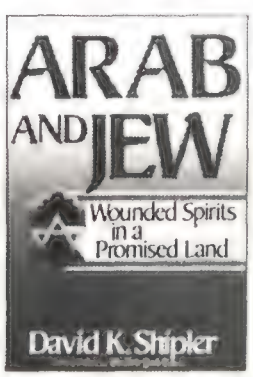

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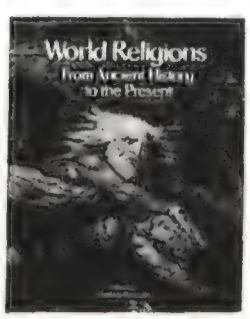

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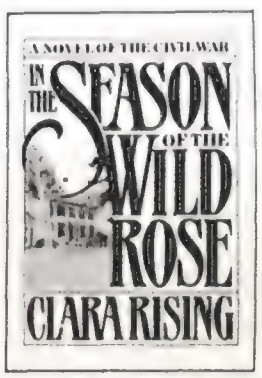

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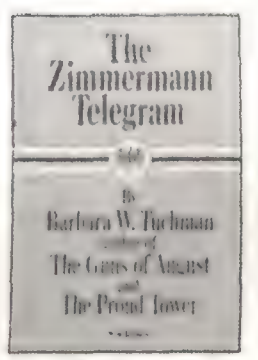

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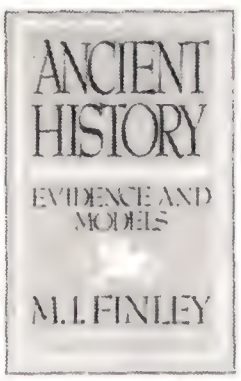

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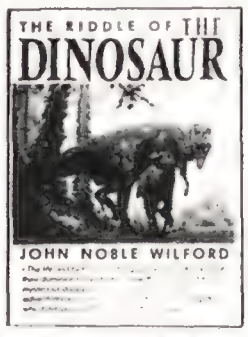

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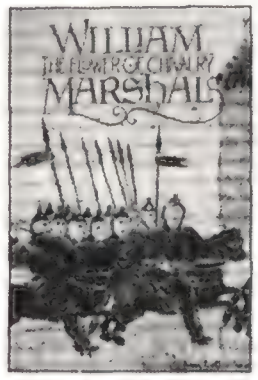

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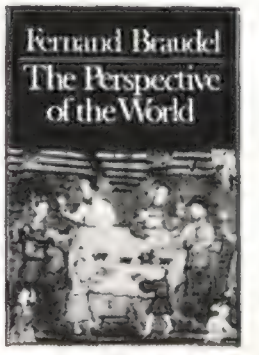

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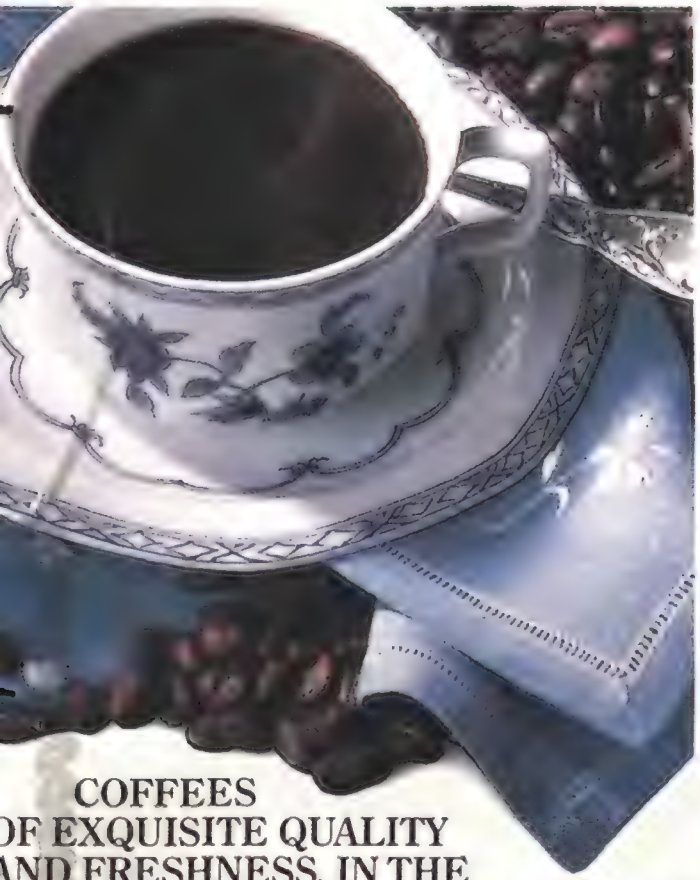

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Around the Mall and beyond

News from Fremantle, Western Australia, has recently contained the strange word *Kookaburra*—the name of two of the Australian sloops which have been racing off Fremantle for the past year vying to defend the America's Cup. One of the editors of this magazine was shocked to find that some of his otherwise literate colleagues hadn't the faintest clue what the word means—even though there are four of them right here in Washington at our National Zoo. "A sort of sleeping bag Australians crawl into to keep warm," suggested one editor. "A huge, wingless bird, nearly extinct," said another.

That last comes a little closer. At least the word "bird" is right. This one is pretty big, but not huge. Far from being wingless, it flies fast and very quietly. And all who know it are glad that it's nowhere near extinct.

Australia's "laughing" kookaburra (*Dacelo gigas*) is a giant kingfisher, about 18 inches long, who lives not as much on fish as on small mammals, birds and reptiles. It's his voice that has brought him—and Australia—fame: a long, insistent, insane cackle of laughter, starting low, changing tone and intensity as it continues, and finally finishing off with unrestrained shrieks of helpless hilarity.

Although I've always felt that the writers of bird books must slip into a peculiar stage of dementia when they try to describe bird calls in human syllables, I am compelled to give it a shot myself: "Koo, koo, hoo, hoo—hoo—*hoo—ha—HA—HA—HAHAHAHA*!!!!"

And that absurd piece of writing only hints at the true sound, with its rising volume, accelerated pace and increasingly manic hysteria. You are jarred awake by it at dawn's first faint blush, and when it dies out, you lie in bed, eyes wide open, waiting for the racket to

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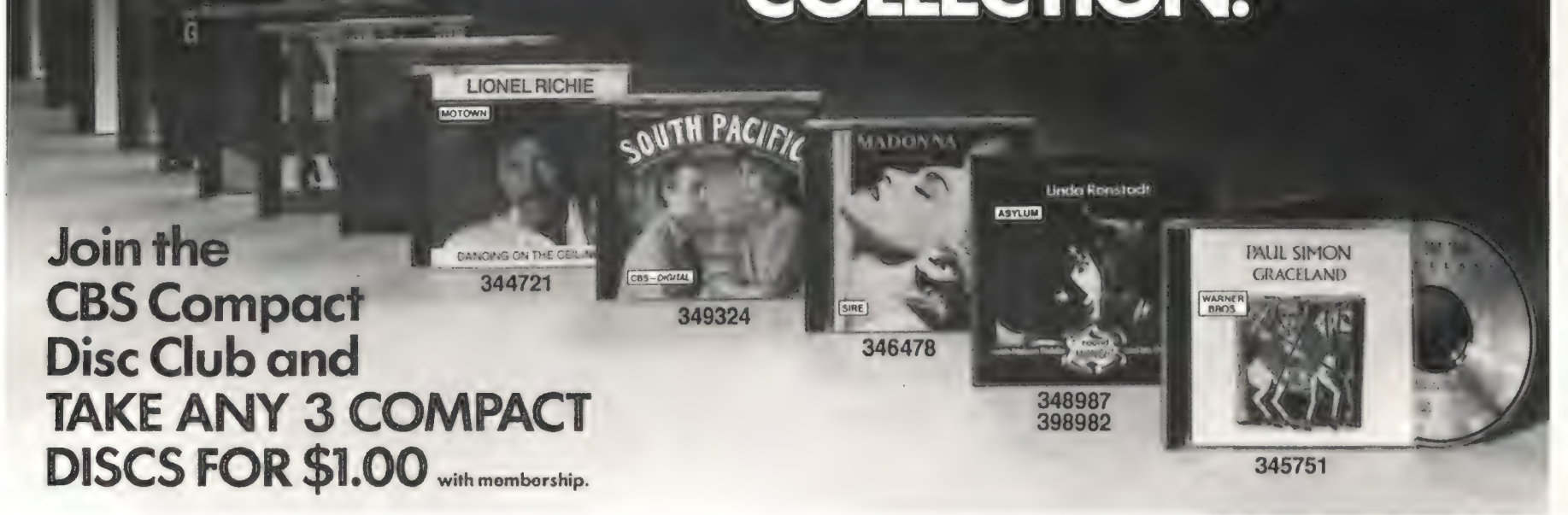

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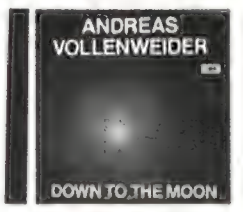

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start again. But it seldom does, where I've heard it. Not until dusk does it erupt once more.

One bird starts this raucous cacophony, and then others pick it up. The lunatic sound rolls through neighboring backyards and up into the hillside trees, wherever the group of kookaburras resides. And that's just about everywhere in Australia. *Dacelo gigas* has always occurred naturally in the eastern half of the continent, and around the turn of the century it was introduced in the states of Western Australia and Tasmania. It has prospered there. The birds have moved close to the big cities and are welcomed in the suburbs, even though they rob the nation's breadwinners of sleep. That's the strange thing about that laughter. You may curse it, but you also can't help having a small chuckle along with it.

Among *Dacelo gigas*' many names is Settler's or Bushman's Clock. It's also called Laughing Jackass, from which springs Jack (Jock if you're an immigrant Scot), Jacko, Johnny, Laughing Jack and Johnass. And there are literally dozens of aboriginal names, many of which contain "burra," or something close to it.

Australia's kookaburra *Dacelo gigas* is noted for rollicking, fiendish "laugh."

One aboriginal legend has it that the bird wakes the sky people in time to light the great fire of the sun.

"New Australians" from Europe, who flooded into the nation after World War II, sometimes called the bird Ha-Ha Pigeon. They did so, goes the story, because they sometimes shot it. Shooting Jacko isn't done by Old Aussies, but shooting a pigeon often is, for it can go in the pot to feed a hungry swagman. Presumably the New Aussies didn't shoot this "pigeon" for dinner, for I doubt if it's got much in common with squab under glass. They simply took a dim view of being roused by hilarity at 4 A.M.

The kookaburra's own food ranges from poisonous snakes up to two-and-a-half feet long to bits of freshly grilled sausage filched from your paper plate at Sunday's barbecue. The big bird has a fast, darting flight, zeroing in on a target quickly and accurately.

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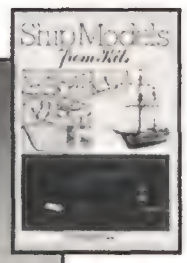

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ing the snake as soon as the other has dropped it, and repeating the process until the prey is battered to death. Then Laughing Jack gulps it down, inch by inch. I've seen one fly by with at least a foot of snake dangling from its beak.

Sometimes the bird overmatches itself. One was seen to seize a hefty lizard, try desperately to get off the ground with it, and crash ignominiously in a field. Others have been rescued from snakes which managed to coil around them after being grabbed. Unable to fly, the bird could only squeeze with its beak, and the serpent with its body, and neither dared let go.

Jacko's battles with snakes may explain why it is an Australian legend. This extraordinarily beautiful country exacts dues by making you aware of a large complement of venomous snakes. For example, playing at the Tewantin-Noosa Golf Club in Queensland, where kangaroos hop across the greens, you slice off a fairway into thickly tufted tall grass—at least *I* do. You start to search for your ball, and your Australian friends quickly suggest that you just throw another out.

They don't tell you why, but they make sure you don't wander into that tangle, and you soon figure out the reason. You're grateful to your friends, and they, in turn, are grateful to any other creature that keeps snakes from intruding on their normal life-style. So Tewantin golfers are happy to glimpse, in the branches of a tree at the edge of the rough, a slight movement of brown-and-blue wings, and to spot two kookaburras quietly on watch. The birds make you feel cared for.

The fact is, those two are probably waiting for a chance to rob the nest of some smaller species—a safer way to forage than attacking a deadly tiger snake. A naturalist once watched a pair of kookaburras stashing baby wood swallows in their own nest, a hole in a tree, at the rate of 19 in an hour. Such depredations led a Melbourne University professor to call the famous laughter the "full-throated gloating of sin triumphant."

To descend for a moment from these dizzying heights of anthropomorphism, it's really just a territorial imperative that provokes the maniacal glee. A group of Jacks is rigid about its turf, and carefully patrols its borders. Two are apt to fly back and forth between two trees, passing each other midway, as regularly as the guards at Buckingham Palace.

Laughing Jacks seem to get along passably with the only other kookaburras in Australia, the blue-winged species, *Dacelo leachii*. This is a slightly smaller variety with strange white eyes that add an extra madness to the satanic impact of its voice. For this prominently blue-winged bird of the tropical north warps the guffaws of its cousin into a series of startling huffs, eerie howls and sharp barks.

Before our Australian visit this winter, I popped into the bird house at the Zoo to see what the Smithsonian had in the way of giant kingfishers. One of the first birds to come in sight was a splendid *Dacelo gigas* on a lofty perch, displaying that big, off-white breast and head, and just a bit of blue on its wings. I couldn't see the rusty brown of its back.

Typically, it remained perfectly silent and immobile except for the sudden twitching of its head as it kept a beady eye on everyone who came near. I learned that it greets its breakfast mouse with an explosion of laughter which is quickly echoed by a couple of other Jacks in the outer enclosure, until the bird house rocks with glee.

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The laughing kookaburra isn't Australia's national bird. In fact, Australia doesn't have an official national bird. If it did, I suppose, the honor would go to the emu—*that's* the flightless bird, incidentally—which appears with the kangaroo on the national coat of arms. But just as everyone in the world loves the cuddly koala which lures tourists aboard the nation's international airline, Aussies love their kookaburra. They appreciate its feistiness. As for its voice, why that's not much different from what you hear toward the end of any Sydney, or nowadays Perth, cocktail party.

The bird, along with the platypus, serves as the state emblem of New South Wales, and for a time it introduced Australia's Fox Movietone newsreels. Americans used to see and hear it whenever our own newsreels picked up a clip from down under. Later, the voice of a kookaburra (named Jacko) led off the Australian government's overseas radio broadcasts. I remember tuning in a big shortwave set we had back in the 1950s here in D.C., and hearing Jacko's laugh wavering eerily across thousands of miles.

Now the laughing kookaburra has lent its name to two of the 12-meter sloops that have been going at it off Fremantle. An apt choice. Those of us who enjoy the fun of sailing find it hard to follow the fortunes of the America's Cup—such serious races, so wracked by dispute, so dogged by pettifogging legalities, so insanely expensive and too often so damned *boring*—without exploding into paroxysms of imbecilic mirth.
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Phenomena, comment and notes

A guest columnist, the Director of the National Zoo, reflects on the ways that Zoo visitors perceive animals

I learn more about people's attitudes toward animals by listening to them as they visit the Zoo than by listening to colleagues at some of the professional meetings I attend. An unobtrusive eavesdropping is revealing, shocking and sometimes humbling.

One day recently, I was standing outside our new maned wolf exhibit. I'm a carnivore nut and really like cats, dogs and their relatives more than other animals. Maned wolves, to me, are exceptionally beautiful animals. They can be appreciated at a purely emotional level, like Tchaikovsky, or at an intellectual level like Mozart. They have long elegant legs that are black-stockinged, russet bodies and magnificent large ears. The mane is black and conspicuous. The whole effect is that of the elegance of a borzoi combined with the impression of a wonderfully tuned prey-catching machine, a sports car with teeth. Not only do they look beautiful but they move with grace and beauty. The slow walk is slightly mincing, like that of a fashion model, but their run, a loping gait, is poetry.

So, there I was watching these amazing animals and next to me was a youngish couple newly arrived at the Zoo. The woman turned to the man as the female wolf emerged from her den: "Look, look at that." So far, absolutely the right response, but his reply spoiled my day: "Ugly, u-u-u-ugly!" I left, despairing of all mankind. I should have stayed and tried some educational conversation, but

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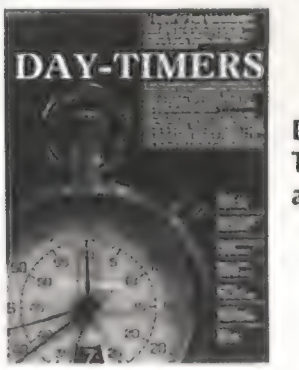

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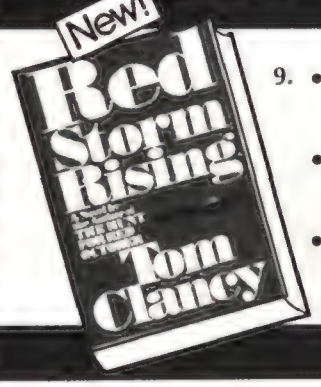

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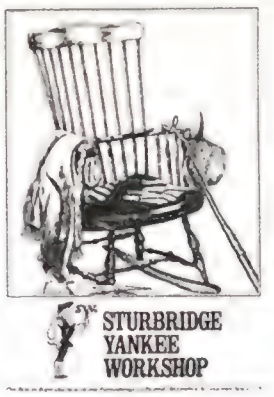

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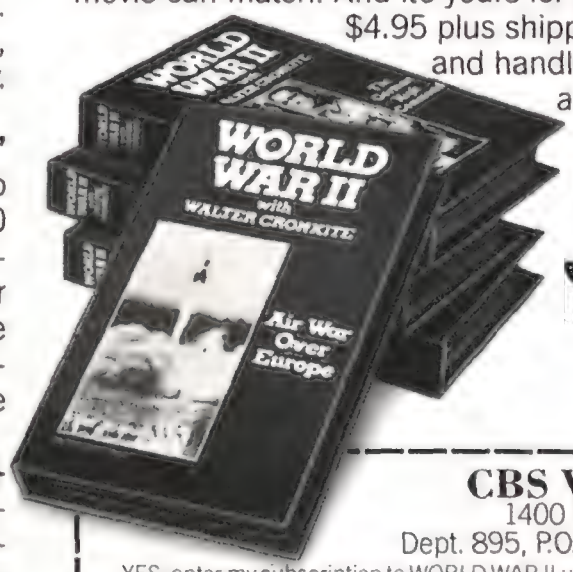

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To an appreciative eye, the maned wolf can be the epitome of leggy elegance.

I was shattered. Of course I don't expect everyone to have the same taste in animals any more than I expect everyone to like Richard Strauss. But . . . but, the incident started me thinking about our perceptions of animals. How do we acquire such varying attitudes? How can people think that all insects are nasty and should be squished and that all snakes should be killed on sight? Why are people revolted by spiders when, to me, they are endlessly fascinating?

It is an interesting set of questions. Even the background outline of an answer is too complex to attempt here. Konrad Lorenz, the Nobel Prize-winning European ethologist, came up with an interesting speculation as long ago as 1943. It concerned the kinds of animal faces that evoke affection. Please note that we are talking about affection, not love. The hypothesis has not been thoroughly tested, but I find it seductive. Lorenz argued that humans are attracted to faces that have the gestalt of human babies. The important features are a high forehead, small nose, large eyes and a generalized chubbiness—a configuration said to "release" parental impulses. If this is true, we can explain why long-nosed small-eyed animals are unappealing (evil, mean, nasty, etc.), while large-eyed short-nosed animals should elicit the oohs and aahs.

Pandas, cats, owls, bush babies (even the name may have been derived from their appearance!) score high on our attractiveness meter, while rats, weasels, foxes and opossums score low. Doll manufacturers and Walt Disney have always known this, consciously or otherwise. Giant pandas score magnificently; they are chubby, high-domed and have black patches that build their small eyes

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Most people respond positively to animals that—like the bush baby and the saw-whet owl—have the chubby, wide-eyed look of human infants.

into supernormal orbs. Winston Churchill should have evoked more paternal impulses than Harry Truman! Of course, I can claim that my affection for maned wolves is more sophisticated (i.e., rationally cultivated) than the visitor's "Ugly, u-u-u-ugly."

When we think about eyes in relation to our attitudes to animals, it is worth remembering how important they are in human nonverbal communication. "Drink to me only with thine eyes" came long after Italian women used drops of belladonna to artificially dilate their pupils. Dilated pupils are signals of interest and, putting it politely, arousal. They are most detectable at close quarters anyway. But they are much more detectable in blue eyes than in brown eyes because of the contrast. I will not pursue speculation along those lines, but the mind boggles at the implications for "cold" blue-eyed North Temperate types.

Eckhard Hess, working at the University of Chicago, devised the technique of pupillometry as an objective measure of attention in human beings. When we are excited/interested by some visual stimulus our pupils dilate to let in more light ("All the better to see you with").

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This is largely uncontrollable and a dead giveaway. People may protest that they are not interested in a comely member of the opposite sex while their pupils are simultaneously dilating. They may even believe what they say, but the eyes have it.

This is straying from preferences for, and aversions to, various zoo animals. We have an admirable opportunity to do a well-designed and comprehensive survey of our visitors. Desmond Morris, author of *The Naked Ape* and other provocatively interesting books, surveyed children watching a London zoo TV program to determine their animal preferences. He found what he claimed were age-dependent and sex-dependent differences. (Young children liked bigger animals, older children liked smaller ones, for example.)

I would expect that attitudes are affected by such cultural factors as social class, education, ethnic background—and perhaps innately. But if we are to ensure that the glorious range of life on Earth is preserved, we are, of necessity, faced with the need to change attitudes toward a whole range of creatures. What a task! The naive attitudes of children are perhaps the best guide to what could be if we did not inculcate attitudes of revulsion and rejection in them. Be ye as little children?

I heard another disturbing comment while eavesdropping: "A funny zoo, this—there are no animals." Since, of

With its long snout and beady eyes, poor opossum is often regarded as ugly.

course, we have more than 3,000 animals, this statement needs explanation. The remark was made at a little past noon on a very hot summer's day. The family of visitors had walked by four successive exhibits in which there were no animals in sight. The animals were, in fact, fast asleep in their dens. Admirable animals, I thought. After 20 years in the Hispanic Tropics (sounds better than Central America), I appreciate the biological importance of the siesta.

But the activity of Zoo visitors is almost exactly inversely proportional to the activity of Zoo animals, and to the activity of many animals in their natural habitats. Peak activities for the animals are in the early morning and late afternoon, but our parking lots invariably fill at high noon.

What can we do about this? Obviously we could try to modify the habits of both the visitors and the animals. Morning and late afternoon are the best times for a visit anyway, at least in summer. It is more likely to be cool and pleasant while you are dealing with your enthusiastic children, and you will see a lot of exciting and beautiful animals. Should we perhaps encourage visits at the best times by scaling the parking-lot charges to reward the early and late visitors? We are modifying exhibits so that there are attractive shady areas where animals can be seen when they are asleep. Such spots can be made even more attractive to sleepy beasts than the dens. This solution may not be ideal: although a jaguar in repose is a beautiful sight, it is even more beautiful when it is active. Perhaps we can extend the activity period and still maintain stress-free, happy environments. We think we can, but the job will be labor-intensive and we are already understaffed.

To increase natural activity we can distribute the food of animals more extensively over time and space. Few animals in the wild have food at regular mealtimes. (Neither did our ancestors; maybe regular meals are as unnatural for us as they are for zoo animals—just an administrative convenience. What a wonderful biological rationalization for snacking!) Scattering hidden food throughout an exhibit should produce more active, fitter animals and combat obesity. Hunters would truly have to hunt and gatherers have to gather; the soup kitchen would be replaced by the treasure hunt. We would all benefit.

Michael H. Robinson

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By Michael Parfit

Coping with blackout: what happens when the lights go out?

Electricity seems a lot like magic—until our neighborhood suddenly goes dark; that's when the power company does its sleight of hand

Then, within minutes, the city was stripped of its power in our history's most celebrated blackout.

Noreen Wick was accustomed to crisis. After all, she had raised ten children. So when the lights went out at 8:24 P.M. on the stormy night of Valentine's Day, while she was getting ready to do some knitting, she calmly got out two candles and took her two daughters who remained at home into the dining room. Sitting down with the knitting to wait, she told herself she would not let herself become edgy—but the power company, she hoped, would soon have the lights back on.

The whole neighborhood was dark. The lights were out for about 800 people who lived around the adjoining city limits of the Southern California suburbs of Sunland and Tujunga, which share a slope on the edge of Los Angeles' San Fernando Valley. Plainview Avenue, Mt. Gleason Avenue, part of Tujunga Canyon Boulevard, and up in the hills along Alpine Way—the area seemed to have dropped out of existence.

In a way that was true. Electricity has become so central to American life that when it disappears the darkness seems alien and dangerous. Blackout! In stranded elevators, in blinded movie theaters, in subways, in shadowy offices where all you can hear is the sigh of millions of bytes of information dying out of computer chips, and in neighborhoods like Noreen Wick's, a blackout is scarier than lightning; and when it hits, suddenly the power company is the most important force in the world.

Blackouts hit Americans so hard that they are automatic news, like tornadoes or earthquakes. Thus, there was a sense of disbelief throughout the country when the 1965 blackout darkened the Northeast, leaving New York City bathed only in moonlight. A blackout

teaches a society about itself: in 1965 *The New Yorker* magazine found such peace and camaraderie in the streets during the blackout that it said "this was not a disaster but merely some festival of inconvenience." That blackout showed, too, how much electric-powered diversions occupy time and interest; without them people turned to more old-fashioned activities, and nine months later hospitals were inundated with new babies. But when the next great blackout hit the city, in 1977, the mood was less benign and looting was so bad that Mayor Abraham Beame talked about a "night of terror." A scholarly article later observed that the blackout had given "a sneak preview of economic and social changes that . . . would not have become visible for several more years."

The escalating price of darkness

Blackouts have a burden of direct costs, of course. Starting with the power company's lost revenue, the price of darkness escalates by the minute. The 1977 New York blackout cost at least $350 million. Average figures for typical blackouts are harder to come up with, although one utility estimated that during a 20-minute outage, each unavailable kilowatt of load cost each residential customer four cents, each large industry $2.46 and each office building $6.72.

The causes of blackouts vary. The '77 outage was triggered by lightning. Every New Year's Eve, dispatchers and repair people all over the United States work overtime fixing lines shot out by celebrating riflemen. During Olympics ceremonies in 1984, dispatchers in downtown Los Angeles watched the television that hangs on the wall in the dispatch room with dismay as hundreds of balloons with metalized tails floated, shining, into the air above the Los Angeles Memorial Coliseum. Soon enough, one dispatcher remembered, "even the national TV blipped." The balloons landed in lines a few miles from the stadium and put on a fireworks display of their own.

In Noreen Wick's neighborhood it was the wind. A storm that had beaten Northern California to a soggy pulp hit Los Angeles that evening. At 8:24 P.M., years of withstanding the tension of wires and the pull of wind finally became too much for an elderly crossarm on a pole that stood at the corner of Hillrose Street and Oro Vista Avenue in Sunland. The crossarm's north side snapped off. The three 4.8 kilovolt (kV) wires it carried flailed suddenly, sagged and twisted together. A flash lit the street. It was observed with some shock by two couples who were standing in the rain one block south trying to jump-start a car.

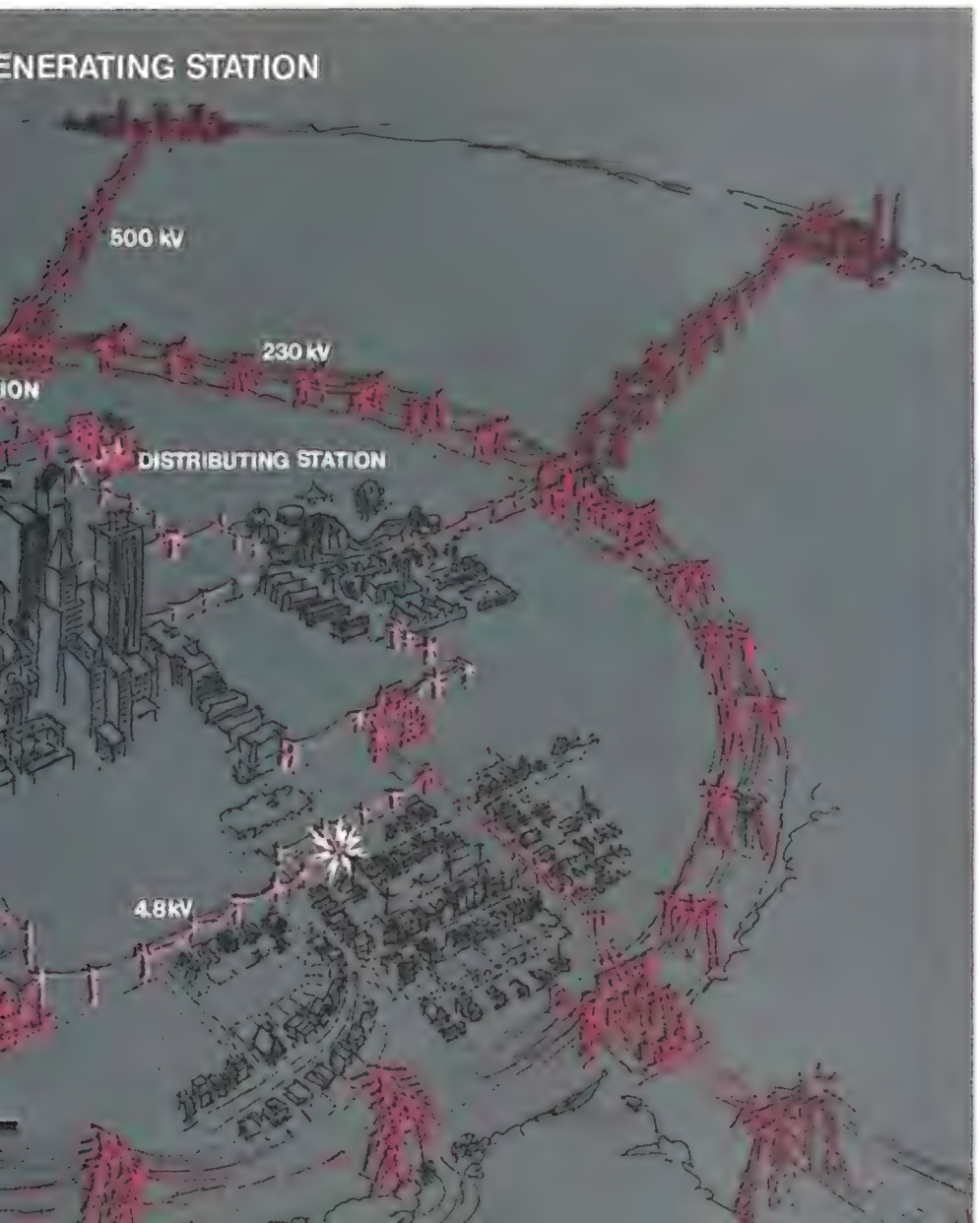
When there's a short in a house, a fuse or a circuit breaker blows. It is the same in a power system; it's just that the breakers stand ten feet high and are filled

Within the Energy Control Center of Los Angeles' power company, dispatchers juggle the electrical flow.

Electricity comes to the consumer in Los Angeles from generating stations (at top) that provide power; from left, hydroelectric, nuclear, fossil-fuel plants. Long-distance transmission lines carry power to city.

Circuit diagrams for the city are called up on the computer, and switches are thrown by remote control.

Once there, it is converted to AC, transmitted to a receiving station, sent on to distributing stations and finally routed at 4.8 kV to neighborhoods. Flash in diagram indicates the outage in this story.



with thousands of gallons of oil to smother the spark. Down on Foothill Avenue, about a mile away at Distributing Station 72, a big circuit breaker tripped open inside its tub. That was the moment at which Noreen Wick started looking for her candles. It was also the moment at which a message passed swiftly to the heart of the Los Angeles power system.

Some distance from Sunland, at a location that shall remain secret (power companies are nervous about sabotage), the message immediately appeared on a computer screen. The computer was inside a huge, windowless blockhouse of a building that stands hidden in hills. Its glass doors are mirrored and blank. Inside is a little window for the presentation of I.D. cards. A warning sign reads "Sulfuric Acid." A casual visitor gets the impression that if his face doesn't measure up he will be dissolved on the spot.

This place is ECC—the Energy Control Center for the Los Angeles Department of Water and Power (LADWP), the power company that serves Sunland-Tujunga and all of Los Angeles. Inside ECC is a huge round room (left) that looks like the heart of the Strategic Air Command. Its curved steel wall is covered with diagrams of the Los Angeles electrical distribution system and the sources of electricity.

ECC, like control rooms all over the country, is LADWP's hub. ECC sees all and knows all, at least when the computers work. (On the rare occasions when computers break down, each screen is filled with a picture of a man hitting an alligator with a stick.) The idea, says Fred LeBlanc, an ECC senior load dispatcher and training officer, is that "you can walk into the room and have an instant overview of how much trouble you're in." For lay people, getting an overview of how blackouts happen and are fixed takes a little longer. You have to start with an understanding of how a modern electrical power system works.

The system begins at generating stations—the burning of coal, oil or gas; nuclear fission; falling water; the heat of the sun; the force of the wind—whatever can make a dynamo whirl. From there the power is fed into transmission lines—"steel soldiers of progress marching across the land," says one power-company executive. Transmission lines carry electricity hundreds of miles to what are called receiving stations. The receiving stations turn over the power to distribution systems, which carry the power into the streets. In the power business, "transmission" and "distribution" describe parts of the system that are as related yet distinct as two Scottish clans.

In trying to explain how to think of transmission

The author, a frequent contributor to these pages, wrote about the Polar Duke, *an Antarctic marine-research vessel, in the November issue.*

and distribution, power-company people struggle for comparisons: "Metaphors," one says, "are a highly prized entity." One image that leaps to mind is the corporate organization chart. The wall at ECC looks a bit like one, so maybe that's apt. The power company is the chairman of the board; at the desk of each vice president is a generating station. Transmission lines are the department heads, passing high-voltage authority on down the line. After transmission, you get into the distribution section, a kind of blue-collar district, the place where the real work is done. Here the chart branches out, with the voltage dropping all the way. The line that gets to Noreen Wick's house is the mail-room clerk. In Los Angeles each mail-room clerk, a 4.8 kV wire called a distribution feeder, handles about 800 people.

It's more complicated than that, of course. Distribution systems vary. In Los Angeles, distribution lines run radially out from distributing stations like spokes from a wheel (pp. 40-41); in most Eastern cities the system forms more of a net. And the line at the house is not as isolated as the mail-room clerk; there is almost always more than one way for the power to come down the street, so at that end of the operation it's more like a secretarial pool.

The upper end of the system is complex, too. There isn't just one power company and a handful of generators. In the area covered by the North American Electric Reliability Council, which includes Mexico, the United States and Canada, demand peaked at 506 gigawatts in the summer of 1985; this was generated by thousands of power plants, most of which were connected to each other. LADWP, like most of the nation's 3,400 power companies, is tied in to a huge power grid called an interconnection. Four major grids cover North America: the Hydro-Quebec system; the Eastern Interconnection, which serves most of the rest of the continent east of the Rockies; the Texas Interconnection and the Western Interconnection. Los Angeles is part of the Western grid, a network of lines that taps generators extending from Mexico to Canada.

In comparing the corporate organization chart with the interconnection system, you cannot say that each collection of linked generators and transmission lines that makes up a power company is like a subsidiary company under one grid command. Rather, to adapt the metaphor, each power company in the grid is more like a member of Congress: individualistic unto itself, but dependent on its colleagues to get things done.

"The grid system takes advantage of what we call diversity," says Kenneth S. Miyoshi, assistant chief electrical engineer for LADWP. The downside is that what affects somebody else also affects you. "We once got a call from someone in L.A. whose computer had burped," recalls Wayne Bente, an LADWP trouble dispatcher. "Turned out the Anaconda line in Montana had been hit by lightning."

One of the main reasons for this linking of lines is to permit what are called economy exchanges—the dealing of power back and forth through the system. In the spring and summer, for instance, Southern California utilities are able to buy surplus dam-generated power from the Northwest instead of running their expensive oil-fired plants. Later, when the rivers are down, the flow of electricity might go the other way.

Power originating almost 900 miles away

Thus the power from which Noreen Wick had been abruptly disconnected in Tujunga, California, may have been coming from as far away as The Dalles, Oregon. Lights on ECC's wall showed that, at that moment, a massive 2,000-megawatt converter station (p. 44) in that Oregon town was sending 1,490 megawatts of electricity to Los Angeles. The station was changing AC to DC in its vast halls of mercury-arc and thyristor valves. The electricity, generated by dams on the Columbia River, was coursing down a unique wire: an 846-mile-long, million-volt, DC transmission line.

The two sides of power systems—transmission and distribution—have different kinds of blackouts. The ones you hear about on the news are usually kinks in the transmission grid, as was the case with the 1977 New York blackout. These failures often affect lots of people and can be exacerbated by the linked nature of the grid. But transmission outages are usually caused by only one or two major problems, so once they're fixed, everybody gets brought back to light.

Because of their scope, transmission outages often occur with ponderous deliberation. Alternating current in North America is generated and transmitted at a uniform 60 cycles per second, and protective equip-

Three huge thyristor valves at a facility near Los Angeles convert up to 500 kV of DC power coming in on a long-distance line into AC electricity; power is then forwarded on to one receiving station.

A giant station at The Dalles, Oregon, converts AC power generated by dams on the Columbia River (at upper right) into DC power; electricity is then transmitted almost 900 miles to Los Angeles.

ment is set to cut power if that cycle slows. So if there's a big short somewhere and the generators start dragging as they try to keep up with the drain, certain parts of the system are preset to shut down. Like a wet duck trying to fly, the system shakes free of a burden that has suddenly become too much.

This is called load shedding. In the LADWP system, load shedding begins when the frequency slows to 59.1 cycles per second. "If it gets down to 57 we're in big trouble," says Fred LeBlanc. "If it gets down to 55 hertz, it's going to be a blackout." This is why the 1965 Northeast blackout reached New York City not with a bang but a whisper, with dimming bulbs and slowing escalators, as if the whole world were running down.

The other kind of blackout is the one most people go through occasionally—the local outage, or damage to the distribution system. Since this usually means a broken pole or line, each distribution problem is small. Sometimes, however, problems in the distribution system can be as massive as those caused by a transmission failure. In 1985, during Hurricane Gloria, for instance, two-thirds of Long Island was blacked out when much of the distribution system was savaged by wind. An individual distribution outage can be fixed much more easily than the wreck of a transmission line, but in a situation like Gloria, in which the countryside was strewn with broken wires, people may be without power for days.

A distribution blackout is not likely to announce itself by dimming lights first: it is more likely to plunge you into darkness. The lights may then flash a couple of times because, on many systems, circuit breakers are set to try to reconnect shorted lines once or twice at half-minute intervals. That way, if a short was caused merely by a momentary brush of a tree branch, power can be quickly restored. Your own lights are like a heart monitor for the whole system: if somebody else has a blackout, undamaged circuits may dip when the circuit breaker tries its recovery.

Weather is the most common cause of blackouts. That's why, at ECC in Los Angeles, a small computer maintains 24-hour contact with the National Weather Service. When it reports wind or thunderstorms, supervisors hold the day shift and call in all hands—some to fix lines and the rest to answer telephones.

LADWP has had as many as 70,000 phone calls reporting trouble during one 24-hour-long storm. On November 30, 1982, heavy wind and rain created 892 outages. When the weather is bad the phones never stop. Dispatchers at their desks inside can track a thunderstorm by the calls as it moves across the city like a drunken cowboy, shooting out circuits.

When the crossarm broke at Hillrose and Oro Vista, the circuit breaker tried to reconnect at 30 seconds, then again 40 seconds later, each time setting off another spark to startle the jumpy drivers down the street. Then it shut down altogether and sent its message electronically to ECC. There, Phil Peterson, a load dispatcher, was sitting at his console. It said: "20:24:29 DS-72 5-KV FEEDER LOCKOUT LOCKED OUT." If Peterson hadn't muted his bell, an alarm would have sounded. He reached for the phone.

About 15 miles away, in downtown Los Angeles, the phone warbled softly at Tom Barricklow's desk in the Electric Trouble Center. This two-story room has maps instead of circuit diagrams on its high walls.

Peterson spoke to Barricklow, who wrote down: "Lock out Alarm, D.S. 72." It was 8:26; Noreen Wick's power had been out for two minutes. "Circuit out up on the hill," Barricklow thought, and went for the maps.

It was easy for the computer at ECC to tell him that a circuit was out, but he had to figure out exactly where the damage was. So far he did not have enough information. He was a detective, standing by the body, looking for a witness—waiting for the "A" call.

The lights at Noreen Wick's house up on Plainview Avenue were going to stay off a long time if no one down on Hillrose and Oro Vista called in about the broken crossarm. Barricklow would be able to put clues together with the addresses of people who called in to report their own personal electric trouble, but without that "A" call he, too, would be in the dark.

The "A" call got its name from the company's system of assigning priorities. In the transmission system, for example, priorities are set for both automatic load shedding—what happens when the cycles slow—and for times when large areas must be dropped by hand, which might happen if there were an hour or more of warning (if, for instance, a generating plant started to die). When loads are shed automatically, the system first drops off pumps that store water in its reservoirs. Next to go are residential chunks. The last islands of power are the areas critical to the city—the center of downtown, for instance, where police and city officials are headquartered, and major industrial areas.

Trying to avoid looting chaos

The manual load-shedding procedure is similar, and is outlined in several red books called *Emergency and Disaster Procedures*, which are confidential. Under manual load shedding, which can be more finely tuned, the power company can cut power to relatively small areas; this helps to avoid the looting chaos that hit New York in 1977. As usual, residential areas are the first to go black.

At the distribution end, outages can't be controlled as easily, but priorities are set for who gets the repairman first. Again, homes are at the end of the list. LADWP uses a system of four letters: A, B, C and X. When a customer is hooked up to the system, it is given a priority: "A" customers are hospitals, police departments, airports and people with life-support systems; other utilities and certain industries are "B," other industries and offices are "C." Everybody else is "X."

Of course, if someone's home happens to be on the same distribution line as a hospital, that home will get the benefit of the hospital's priority. But that's not something you're likely to know; to keep the setting of priorities from becoming political disputes, companies keep them confidential.

Getting back to Barricklow at the Electric Trouble Center, the calls that come in to the switchboard there are also given priorities. Here the criteria are how much information a call contains and how significant an outage it indicates. If you call and say your own lights are out, that's an "E" call. If it's a business, that gets you a "D." If your neighbors' lights are out as well, you also get a "D." That doesn't mean nobody will attend to the problem, just that other things get more immediate attention. The "A" call is special.

Ed Silvestri lives near the corner of Hillrose and Oro Vista. At 8:24 he had been looking out the window and saw the flash. He didn't hear the noise of the short, the harsh grunt and roar that linemen call the "bellow" of electric fire. But he saw wires hanging loose and sparking. "It was kind of funny," he said much later, "because we hadn't lost any power. But we called anyway." This was the "A" call. Sixteen more would come in reporting lights out in Sunland-Tujunga, but this one nailed the trouble to the map.

The switchboard operator typed what Silvestri told

At training center for Los Angeles' power company, cableman applies molten lead to a cable splice.

Manning the phones at Los Angeles' Electric Trouble Center, operators take calls; from these, clues are pieced together as to the actual source of an outage.

her into the computer and moments later the printout was in Barricklow's hand. "Wires down," it said. "Pole to pole. Explosion/flash. Sparks; hanging over street." Now he had something he could work with.

"It helps to know geographically what you're thinking about," he said later. "It also helps to have worked here for 22 years." He got out the map of circuit 72-4. The line left the distributing station, made a turn at Hillrose and Oro Vista, but didn't begin serving customers until it got up past Woodward Avenue. That's why Silvestri still had lights.

The map also helped him decide priorities. There was a green sticker on it with the words "Critical Feeder." He saw why: the circuit fed power to a main water-supply pump and a main sewer pump. If he had had one patrolman and two circuits to fix, he would have picked this one first. Barricklow also checked a book that listed all patients with life-support systems in their homes, referenced by circuit number. If a life-support system had been shown on 72-4, he says, "I would have jumped up and called the home and said 'What's your tolerance? We can hook you up with a generator if you need it.' "

Many hospitals and police stations have their own backup generators, but blackouts still sometimes darken operating rooms. When Austin, Texas, was blacked out in 1983, Dr. Gerald Baugh was operating on a patient who had a pacemaker. He couldn't wait for a generator to arrive. He traded the overhead light for a flashlight, and while someone kept a life-support system going by hand, he completed the operation.

By 8:40 both were on their way

In Tujunga no such crisis was under way. So Barricklow picked up the phone, flipped a switch to connect it to the radio, pushed a button with his foot to transmit and called into the field. The patrolmen he reached were Al Garrison, in one van, and Michael (Mickey) Flynn, in another. By 8:40 both were on their way to Hillrose and Oro Vista. Noreen Wick had been sitting in the candlelight, knitting, for seven minutes. How long her house would remain dark would be determined now by what Flynn and Garrison found.

The two patrolmen, each with a helper, got there before 9. Their vans crept around the corner as the men looked for the break, their spotlights sending columns of glitter through the heavy rain. "You go out in the middle of the night," a former lineman once said, "in driving rain, and you don't know what you're walking into." When Flynn's light settled on the broken crossarm, he knew—and he couldn't fix it.

It was Flynn's 31st birthday. He is a calm and articulate man who likes his job. "You work your way into trouble," he says. "You're your own boss out here."

Like most of his fellow patrolmen, he put in a three-year apprenticeship before becoming a journeyman lineman and cable-splicer. (Lines are above ground; cables are below.) He faces as much danger as a fireman, but is unperturbed that the public doesn't recognize the risks of the job. As one former lineman has said, "They're dealing with three hazards out there: height, electricity and the weather. Policeman get to retire after 20 years. Linemen have to work until they're 65." Yet the children of linemen become linemen. LADWP is full of second-generation talent.

It didn't take Flynn and Garrison long to recognize that it would take a full repair crew several hours to get that crossarm fixed. They got out into the rain to discuss it. Fortunately there were other options.

Alternate power routes can be used

Most power systems have built-in redundancies. Even the vast power-grid transmission lines that string across the country from Canada to California or from Ohio to New York are planned so that the power carried by one line can be transferred to another if the first line should fail. The same principle applies to distribution lines: they crisscross a neighborhood in such a way that alternate power routes can be used. The circuit map looks like a maze, with many hallways and a lot of doors, but at any one time that smart mouse, electricity, can get to your house only one way. If that way gets blocked, you just open a couple of doors and the mouse finds another route.

Studying the circuit map, Flynn and Garrison saw that they could open the doors to the neighboring circuits 72-3 and 72-2 and leave the broken part cold until it could be fixed the next working day by a crew. They needed only to throw some switches.

Noreen Wick was watching from the dining-room window when Flynn drove up in his van. The rain dripped off his hard hat and glistened on his coat. She watched him don his climbing gear and ascend the pole. The van's spotlight shone at its top, where three small cylinders hung below the three wires. The cylinders housed switches that were, at this moment, turned off.

At the top of the pole, the rain blew in his face and rattled on his hat. He wore long rubber gloves with leather gloves over them. Now he reached down into the bags he carried at his belt and took out a dry pair of gloves. "When you touch high voltage with wet gloves," he says, "your ears light up." With the dry gloves on, Flynn cleaned the contacts with a piece of steel wool, then slammed home the switches (p. 48).

Nothing happened, but something would as soon as he drove to the two neighboring circuits, climbed a couple of more poles and threw some switches there,

What you can do in a blackout

When a power line falls down in your street, whatever you do, don't touch it. That's rule number one for coping with a blackout. The problem is obvious: the line might still be hot. Just because sparks aren't flying doesn't mean the power is off. Circuit breakers at the substation probably shut the line down as soon as it fell—but testing the reliability of the circuit breakers isn't worth a terminal shock. The circuit breaker may be set to try to reconnect the line sometime during the first minute and a half that it is down —at that point power will rush through it again, if only for a split second. If you're touching the line during that split second you'll run out of memory and future all at once. Don't drive over a downed line, either; although your tires will insulate the car, you're taking the chance that the line may change position and damage you or someone else.

Rule number two is: don't put power into a line; this means do not plug a generator into the wall. It is possible to light your house marginally by doing this, but you could kill someone because the power you put into your house could get out of it, into power lines outside. Going the other way, it will jump in voltage and suddenly you'll be feeding four or five thousand volts into a wire that may be hanging into somebody's yard, or that a lineman may be repairing.

Call the power company if you hear or see something significant: if you hear the "bellow" of a big spark, or you see lines hanging down in the street. If your house just goes dark suddenly, before calling find out: Is your house the only one out? Is the whole neighborhood dark? If someone else has power, where is the dividing line between light and dark?

When repairs are under way, settle in with your candles and wait. (The candles were in a convenient drawer with the matches because you are an organized person who anticipates blackouts and you have stored candles, water and a battery-powered radio and you have a way to keep at least one room warm.)

Turn off or unplug your appliances. There may be little bursts of power through the line; also, when the power comes back on, the alternating current frequency may be momentarily higher or lower than normal. Both those circumstances may be uncomfortable for your machines or your home computer. It helps the power company too, because if, at the moment power is restored, all the refrigerators and other big appliances in all the homes start up at the same time, that in itself can blow fuses and trip relays.

So when the darkness hits don't touch the wires, don't plug a portable generator into your house, call when you have information, turn off the appliances and wait. Go out and talk to your neighbor across the fence. Look up at the stars—they'll seem brighter in this darkness. And, finally, try to think of things that are fun to do in the dark.

too. Flynn climbed slowly down, put his climbing gear back in the van, got in and drove away. Noreen Wick's house was still dark.

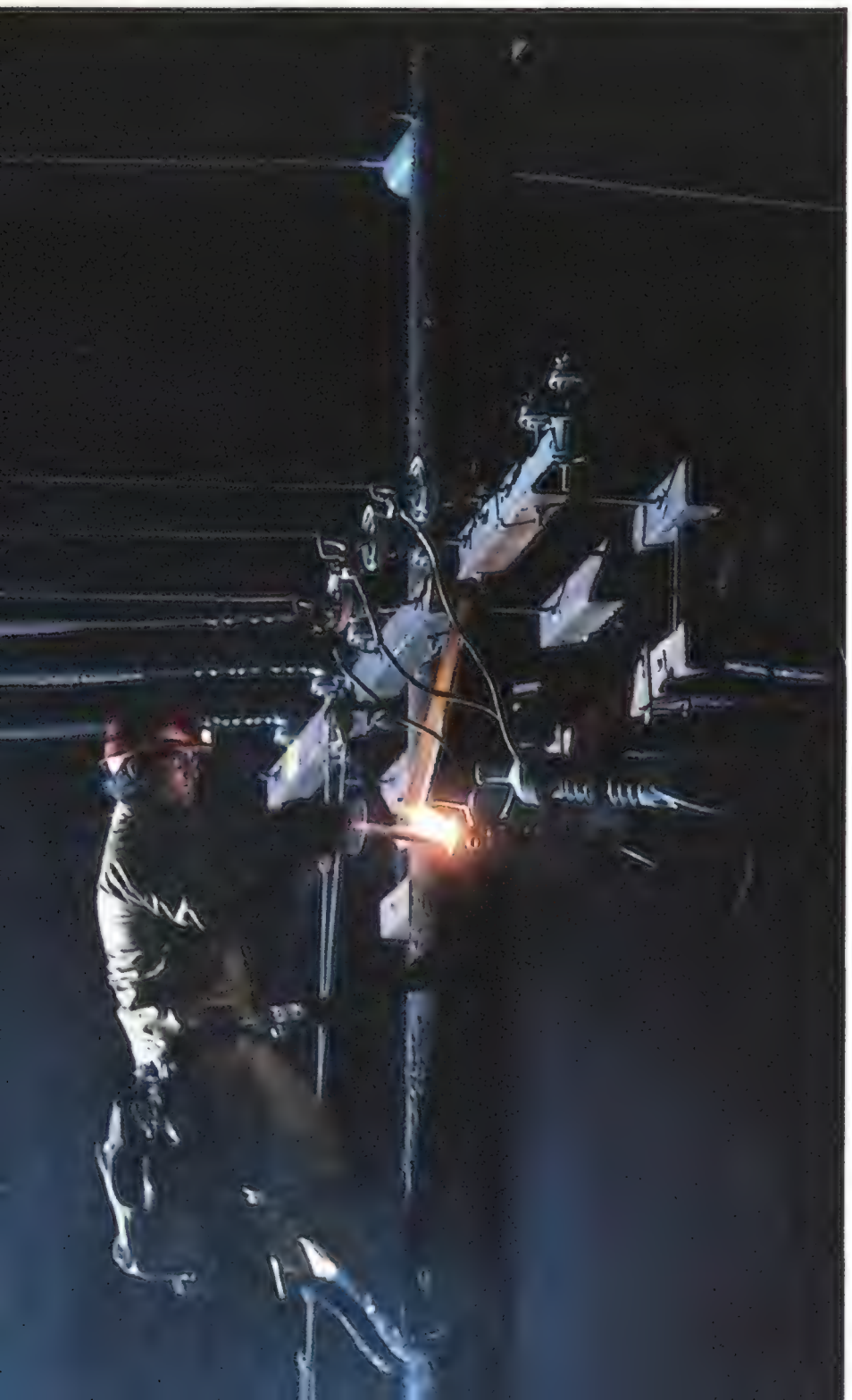
Flynn had noticed the silhouettes of Noreen Wick and her children in the window. He anticipated their disappointment. After 11 years he's learned a lot about how people react to a blackout. Some have faith in you—like Noreen Wick, who went back to knitting by candlelight. Others get angry, but their attitudes usually mellow quickly: "If the power has been out for a whole day, they're mad at you," he says. "No matter what you do, they're mad at you. But if it's out two days, they're back to being glad to see you."

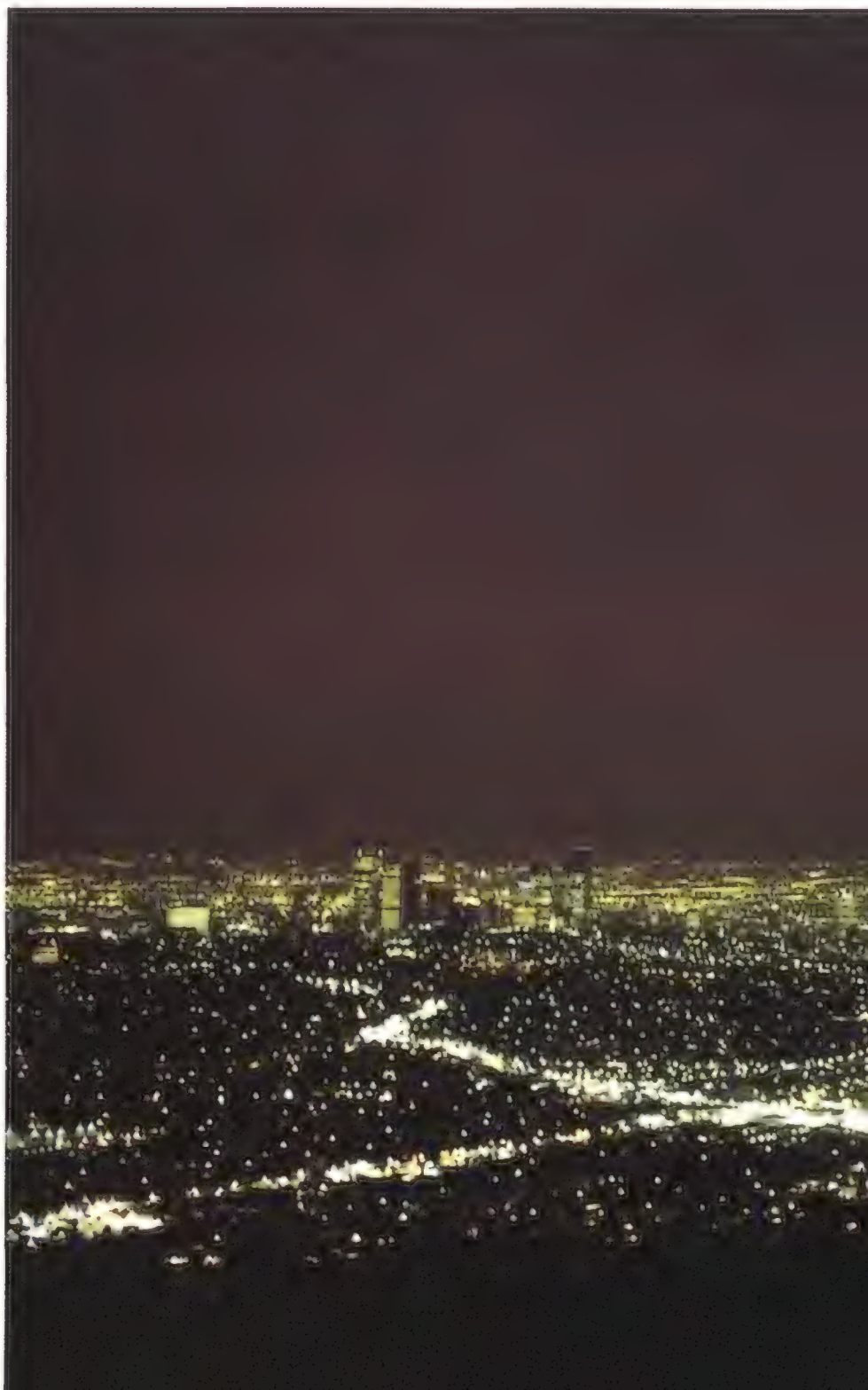
At night in heavy rain people don't leave their houses much. But at the last set of switches, out came John Safian to meet the van. Safian writes poetry; he enjoyed the storm and the darkness. He was friendly but concerned. The house next to his was bright and happy, but his was black. "Those guys have lights," he said, gesturing with a beer can as Flynn put on his climbing gear; "I can't imagine why I don't."

It was the most familiar complaint. Flynn smiled. He pointed to the pole that stood between the two houses. There were three switches in cylinders up there. They told the story: Safian and his neighbor were on different circuits. Once he threw the switches, Flynn told Safian, he'd have his power back. Safian grinned and took a sip of beer. The rain poured and Flynn went up the pole.

The last problem a power company faces during a blackout is that often you just can't turn the power back on. This isn't usually a problem when a small neighborhood is out; you aren't adding much load to the system when you light it up. So, even extensive distribution outages—like those caused by Gloria's rampage—can be relatively easy to pick up, because

Pulling bayonet switch, lineman Michael Flynn opens up a circuit as he restores power to a neighborhood.





they come on one by one. But plugging a million people in after a transmission blackout is like trying to switch on six ovens and a power saw out of one socket.

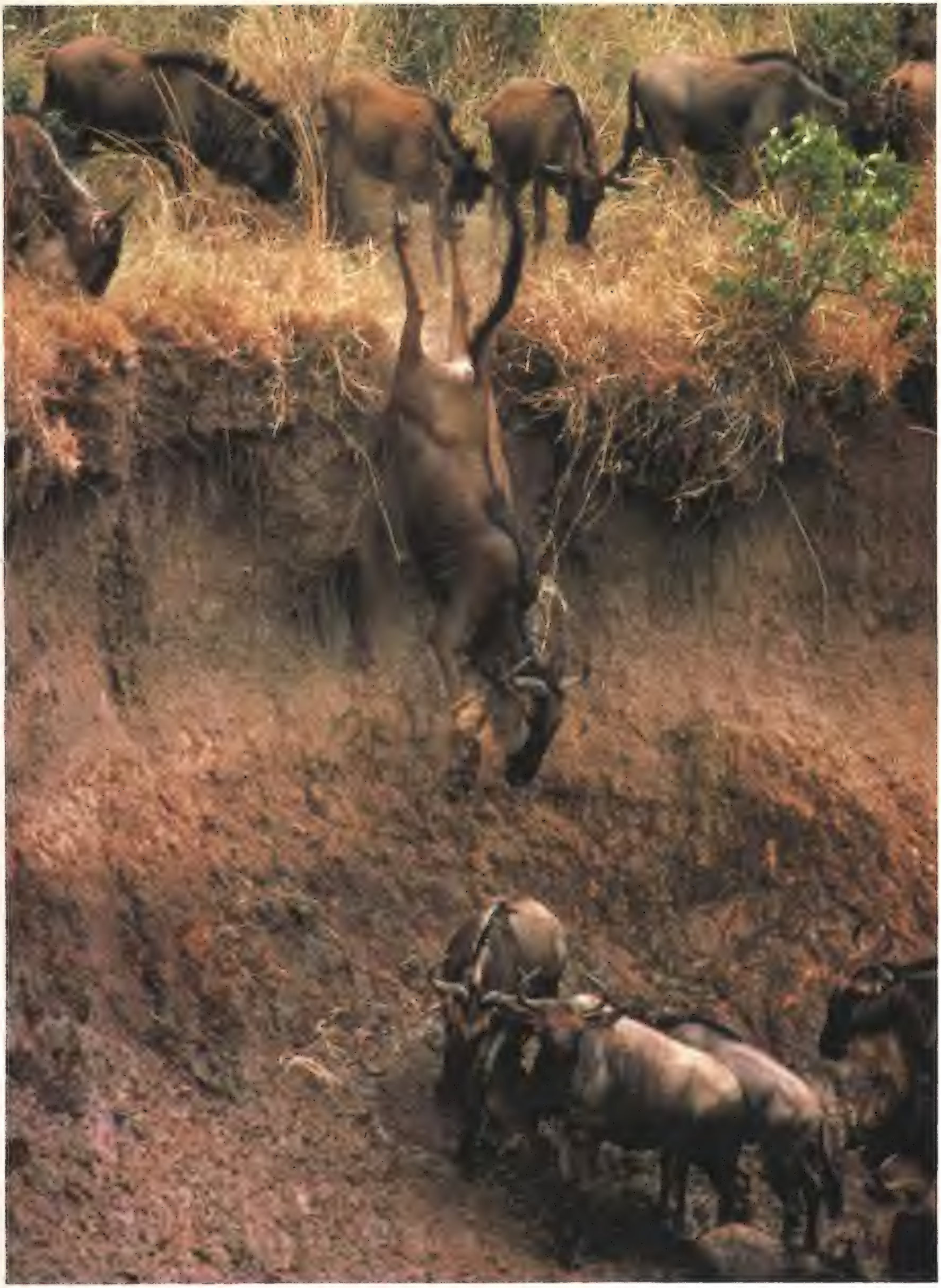
"If you try to pick up a city," says Robert Iveson of the Electric Power Research Institute, "that'll make a generator grunt." And when a generator has to work too hard, the frequency goes down and, bingo, the whole load-shedding process may begin again.

So returning power has to be orchestrated to load up the system gently. Switches are thrown by power dispatchers in control rooms like ECC, or manually in the field by people like Flynn. Sometimes, if the switches aren't available, says Ken Miyoshi, "you literally have to cut copper." Even when everything is fixed, some places light up before others.

But out in Sunland-Tujunga that rainy night the load was not enormous. Flynn could carry it himself. This time he didn't touch the switches by hand. He reached up through the rain with a short orange fiberglass wand called a Hot Stick. With the end of the stick he pushed the switches closed: one, two, three. As each closed, a crisp snap of electricity was heard. Softly, sweetly, all over the neighborhood, lights came on and the glow of civilization returned to Sunland-Tujunga.

It was 10:05 P.M. At the Electric Trouble Center, Barricklow wrote down: "2205 hrs, tie closed." The power had been out for one hour and 41 minutes. At 10:29 at ECC, Phil Peterson got a message on his screen that all was normal at Distributing Station 72. Out in the rainy streets, Al Garrison got into the van and drove to Ventura Boulevard, where circuits 83-4 and 83-6 had locked out. Michael Flynn headed for Woodman Avenue, where a car had run into a pole. And up on Plainview Avenue, Noreen Wick said good night to the girls, put away the knitting, climbed into bed and reached over to turn out the light.

Los Angeles glows under the night sky, its lights taken for granted as the power company keeps vigil.



A wildebeest dives down a bank of the Mara River on its seasonal trek from grassy plains to woodlands. Some injure themselves, drown in the river or are picked off by predators, but the herd is thriving.

By John Heminway

Despite long odds, mighty herds still plunge across the Serengeti

Having survived both humans and disease, more than a million wildebeests follow the seasons in the last of the world's great terrestrial migrations

When the rains come, the herd returns to the plain for the lush new grasses that are the preferred forage. Births are timed to coincide with the reemergence of the grass, a fact well known to the predators.

There was once a time when the name Serengeti made hearts beat faster. Two naturalists, Bernhard and Michael Grzimek, the former in his late 40s, the latter his 26-year-old son, coauthored a book and a film that rang with its poetry. *Serengeti Shall Not Die* brought these vast plains of Tanzania to the attention of Europeans and Americans only just awakening to the realization that the animals of Africa were endangered less by the gun than by human encroachment. Michael—that reckless, laughing, dedicated conservationist—became the Serengeti's first martyr when his zebra-striped airplane collided with a griffon vulture and plummeted to earth. His death ennobled the cause of conservation and transformed this once little-known savanna into a legend.

But that was in 1959 and some memories are short. The wildebeest migration, which the boundaries of Serengeti National Park were intended to secure, var-

ied its course. The country emerged from colonialism and, for nearly two decades, became the laboratory for a new economic order called African Socialism. Tanzania's frontier with its East African neighbor to the north, Kenya, closed and for more than ten years, overseas tourists, one source of the national park's staying power, avoided this penurious and slightly hostile nation. Today, *Serengeti Shall Not Die* is out of print, the access roads to the park are mined with potholes, game poaching on the park's borders has increased dramatically, the lavish government hotels built to accommodate herds of tourists are usually unable to provide either running water or a square meal, and the memorial to Michael is often obscured by high grass.

Six times the size of the 1950s herd

Yet somehow the delicate and interrelated forces that power this fragile ecosystem have not recognized human transgressions. Through sheer misadventure, it would seem, the wildebeest migration that stirred the Grzimeks in the late 1950s has grown at least six times during the intervening years. Today the flat expanse that separates one Serengeti horizon from another is no longer broad enough to contain this advancing army of ungulates. Only from an airplane with a full tank of fuel—precious stuff in today's Tanzania—can a human comprehend the extent of the migration, and even then the view is usually incomplete. Nature, it would seem, is not only profligate, but capricious; against heavy odds, the Serengeti has flatly refused to die, even though its wildebeests plunge headlong into a world that seems to have little room for large-scale terrestrial migrations.

I doubt whether even the most travel-weary visitor can fail to be stirred by this spectacle, the greatest assemblage of grazing animals on this Earth. One February dawn, surrounded by a typical pod of about 10,000 wildebeests and zebras, I had the feeling I belonged to an era of our Earth's history when Man was merely one dot on a far horizon. Everywhere, as far as I could see, our species' much-bruited hegemony over all the world's creatures became a dubious memory. Here quadrupeds were clustered around me so thickly that watching them made me seasick. Most of the herd, feeding on old grass, were females heavy with calves. Every afternoon for the past week I had seen them looking east, toward towering thunderheads looming over Ngorongoro. In the evenings, they followed the course of these clouds and their lightning bolts into ionized air that smelled of rain, looking for emerging new grasses. These fruitless journeys after localized storms resembled huge zigzags on the map of the southeastern Serengeti and now, one week later, this herd was where it had begun and the rain was still to come.

A heaving tide of wildebeests and zebras collects on the bank of the Mara. The animals are afraid to cross.

The wildebeests calve each year in sequence with the first rains. In many years all the calves—sometimes nearly half a million—are born within a three-week period, and most of these during three halcyon days. This strategy allows the lactating females to exploit grass at the moment it attains its highest protein and calcium content.

This year the rains are late; so, too, is the calving. As the wildebeests graze, their lowing sounds like a cho-

John Heminway has written two books on Africa, Imminent Rains *and* No Man's Land. *He is a trustee of the African Wildlife Foundation in Washington.*

The rushing water seems to scare them, and they may wait two days before finally taking the plunge.

rus of giant frogs. When they stop to size me up, they shake their long bladder-shaped faces, over and over, as if trying to deny me something. Both males and females have straggly beards and as they walk they hobble. Nothing fits. In Alan Root's classic wildlife film, *The Year of the Wildebeest*, he describes this creature as having "been put together out of spare parts by a committee." To add to this image of lovable buffoon, one yearling wildebeest gallops through the tightly packed grazers, bent, it would seem, on some madcap escapade. While he runs, he bucks and swirls, spinning on his forefeet, as if a cinch had just been tightened around his hindquarters. Is he bothered by flies? Does he know of a secret danger? Or is he merely having fun? No one seems to care; not one wildebeest looks up.

The other anomaly in the herd is a just-born calf, two minutes old. It is the herd's first and it inspires quite a different kind of behavior. As it tries to rise to its feet, 11 expectant mothers abandon their grazing to sniff. Clearly a curiosity, the wildebeest calf is several tones lighter in color than an adult. About two minutes after we find it, it rises to its forefeet, which, after a moment, wobble and buckle; the calf is collapsed into an awkward sitting position. At the age of five minutes it tries again, and this time the youngster

With the calving season over, the herd picks its way north across a shallow part of Lake Lagarja.

Animals work their way along the bank of the Mara River, looking for a spot where they can climb out.

manages to splay its hind legs, teetering for a moment longer. The next three minutes, once it has its first gulp of colostrum, are clearly the most important in its early development, and by the time it is eight minutes old—almost to the second—it has learned to run as fast as its mother.

Unlike the Burchell's zebra mothers scattered through the herd, wildebeest mothers generally reject a calf if it is unable to make this quantum leap of motor development in the first ten minutes of life. Shortly after we saw this youngster run helter-skelter beside its mother, we came upon another not so successful. It was lying in the tall grass, and were it not for the driver's sharp eyes, we might have run over it. Lying beside its afterbirth, it was still wet. Lump-headed, it looked at us, blinked its eyes and made no effort to rise. We retreated out of sight to see which of the nearby wildebeest mothers would claim it. One briefly moved in its direction and raised our spirits. But then, she was searching only for some nibble of grass, not for a calf. Clearly, this youngster had not risen to its feet within the requisite ten minutes of life; such an early failure is, no doubt, an omen of a developmental flaw. So it is: nature has made wildebeest mothers ruthless judges. All of a sudden, a martial eagle spotted the calf and soon the sky filled with vultures.

To watch the beginning of life on the Serengeti is to be acutely aware of death. Lions, cheetahs, leopards, spotted hyenas, golden jackals, Cape hunting dogs—they all seem to anticipate the birth of so much tender protein. While most lions are territorial, a few follow the wildebeest herd and exploit its profligacy. Generally they idle away the sunlight hours, asleep in the shade, within earshot of the herd's bleating. Their full stomachs and bloodstained whiskers would suggest that at least every other night on average, they cull one more incautious wildebeest from the herd.

Predators are not the only cause of early death. In February 1973, as many as 3,000 newborn calves drowned when their mothers chose to swim them across Lake Lagarja. The lake is no major obstacle; a detour of about three miles might have spared them the tragedy. But when the elder wildebeests forded the alkaline waters, they did so en masse. Mothers soon became separated from their young, and these, arriving at the far bank, turned around to swim back in search of their lost parent. The result was chaos—and a windfall for the resident leopards.

Such natural disasters have little effect on wildebeest numbers. Three thousand out of nearly 1.5 million is statistically insignificant. And while the casual observer notes a colossal number of kills by predators in the Serengeti, the wildebeests that migrate, it has been shown, are better off than those that do not. In the 1970s, biologist Hans Kruuk concluded that the nonmigratory wildebeests of the Ngorongoro Crater lost ten percent of their population annually to predators, while among the migrants of the Serengeti, a mere one percent perished.

Moving has other rewards. A. R. E. Sinclair of the

Frightened by the water, wildebeest leaps ahead, trying to spend as little time immersed as possible.

University of British Columbia monitored the wildebeests during the 1970s. He believes that moving is an adaptation to the Serengeti's grazing timetable. Only in this way can the enormous herd exploit all available food resources. Indeed, if these wildebeests did not migrate, the Serengeti would be able to support only a fraction of what it can today. The behavior pattern of this wild herd resembles what today is being induced among cattle herds by America's most sophisticated cattlemen. Called "intensive rotational grazing," it artificially creates what the wildebeest migration has achieved naturally: a maximum stocking rate on a finite land resource.

For most who live throughout the year with the wildebeests, the experience of observing their epic march never pales. Markus Borner, a Swiss animal behaviorist who has resided at Seronera in the middle of the Serengeti for the past two-and-a-half years, admits he is still overwhelmed by the wildebeest's success. "It looks like such a stupid animal," he says, sucking on a monstrous unlit pipe, "but as a herd it has developed unparalleled wisdom." Chief representative of Bernhard Grzimek's Frankfurt Zoological Society, Borner is a slight man, given much more to asking questions than handing down verdicts. The one gold earring and the disheveled hair seem to declare nothing more than the owner's aversion to pretense. He, his wife, young son and daughter occupy a cluttered bungalow whose lawn is often grazed by wildebeests. When the herd is to the east on the open plains, much of Borner's day is spent flying over it in his Cessna, plotting its course and continuing census work with Sinclair.

"It's really quite an elegant system the wildebeests have created," he says. "Now as they await the rains, the herd congregates in splintered groups across the southeastern corner of the Serengeti and out into the Maswa Game Reserve. They'll stay there, for, of all types of country, they prefer the short- and medium-grass plains, where they can see for miles. When this country dries up, let's say in May, they move northwest —long threads of them—and then northeast through woodlands (which they don't particularly care for but which provide tall dry-season grass) across the border into Kenya. There, by August, the Masai Mara reserve is mobbed by them; a month or so later they start the return, back across the border, to reach the Serengeti's southeastern corner in time for the rains."

While the straight-line distance does not appear vast, perhaps 300 to 400 miles, Borner noted that the wildebeests move erratically and that the real distance covered might be closer to 1,000 miles each year. "There are some old bulls out here who must be 15 years old. Just imagine all the miles they've run!"

Borner pointed out that the Serengeti is, by itself, not that rich a grassland. The soil is essentially hardpan, being the depository for the past several million years of ash from a nearby volcano, called Lengai. Trees rarely survive; only shallow-rooted grasses do well. For much of the year, when the herd has departed, the Serengeti resembles a desert. "But don't be fooled," added Borner; "in most years the wildebeests, even the colossal number we're seeing at present, do not overgraze. In fact, their grazing probably stimulates grass production."

Wildebeests still darken the Serengeti

A wildebeest, wild-eyed with fear, pushes across a river dangerously swollen by seasonal rains.

The wildebeests do not migrate alone. The 200,000 zebras that precede them, in effect, prepare the grazing for wildebeest palates. The zebras can digest high new grass more successfully than the wildebeests. By removing the coarse tops, they permit the wildebeests that follow access to the more succulent and nutritious leaves in the medium-height grasses. In turn, the wildebeests leave behind very short grasses, the food of choice for nearly a half-million gazelles bringing up the rear.

"We think the population is more or less healthy right now," says Borner, "but we're not altogether sure. Possibly there's been a reduction in the number of gazelles as a result of the increase in the wildebeest population. In addition, we suspect there's about to be a food shortage in the north (in Kenya's Masai Mara), but again we're moving in the dark."

Borner's present uncertainty is mostly a result of the Tanzanian economy. Once a large scientific team, the Serengeti Research Institute (SRI) was stationed at Seronera, partly to monitor the dynamics of the migration. Budget cuts in the 1970s, as well as political interference, discouraged much of the expensive research, and today what is now called the Serengeti Wildlife Research Centre (SWRC) has become a randomly administered facility, catering to a few scientists working on their own unrelated research. But this stalemate may change. With new help from the Frankfurt Zoological Society, the New York Zoological Society and the World Wildlife Fund-U.S., the year just begun will usher in new management-related research tailored to monitor changes in animal numbers, health and behavior, in the hopes of staving off any potential "crash." "The new director of National Parks, David Babu, is giving us the kind of encouragement we haven't had in years," says Borner. "He knows, as we do, that right now there might be a dramatic die-off of the wildebeests and we wouldn't realize it until it was well under way."

The wildebeests are only one puzzle in the Serengeti. After meeting with Borner, I spent a day with a pack of Cape hunting dogs. Eight were adults, seven yearlings. All morning they lay up in the crannies of a small rocky outcrop, one of the inselbergs that every few miles pimple the flat surface of the Serengeti. Unlike most other predators, wild dogs generally live together in absolute harmony. The young usually greet their elders with ritual submissiveness, and acts of hostility are rare. The rules of behavior seem to be laid out quietly, resulting in a subtle canine courtesy.

But when wild dogs kill, all gentility vanishes. For great distances they lope at six miles an hour. When they run in pursuit of a quarry, few motorized vehicles can keep up. Their victim, as I watched, was a just-born Thomson gazelle. They harried it in a broad circle, with each dog spelling another in relays. In two minutes the animal was beaten. No more than a minute and a half later, all that remained was one femur. Among the wild dogs there was no scrapping for leftovers. In fact, the female who possessed the femur was mounted by a young male. For the rest of the afternoon, the dogs resumed a civil way of life, lying next to a pool of water, wagging ears and tails, whining with excitement whenever one drew near another.

"The wild dog is the most endangered predator in the Serengeti," Borner had told me. In Kenya, many of the old-school British game wardens had shot them on sight because they disapproved of their technique of killing. For years the Serengeti maintained its popu-

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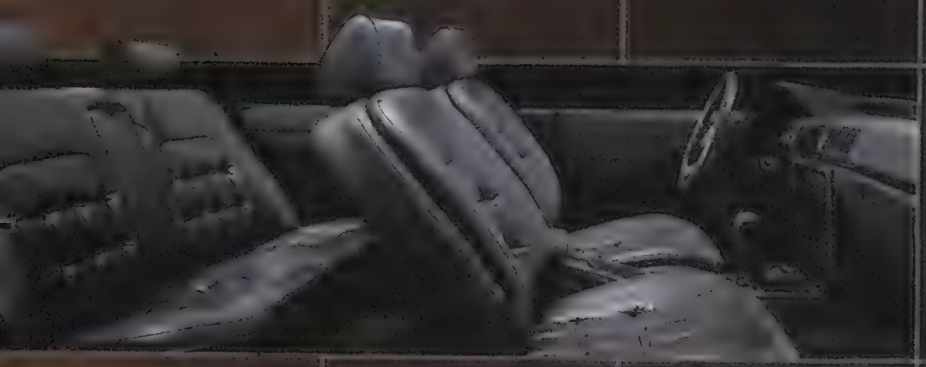

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Get More From Life...Buckle Up!

Crouching below the bank, Alan and Joan Root film the herd's headlong rush to cross a watercourse.

Scientist Markus Borner, left, chats with Bernhard Grzimek, whose film and book helped save Serengeti.

lation by dint of having a more enlightened warden, and then suddenly within the past decade, dog numbers have declined. In all the Serengeti's 5,600 square miles, there may be as few as 80. Next door, in Kenya's Masai Mara, there are none. "I think it may be distemper, but one can't be sure," explained Borner. "You see, that's the kind of uncertainty our new monitoring project can attempt to correct."

Markus Borner is the first to admit that the Serengeti's great success today owes much to chance. "It was pure luck, good fortune—call it what you will—that these plains have been protected and the wildebeest migration endures. If today we had to establish the Serengeti National Park all over again, it would already be too late."

The marvel of the Serengeti is its innocuous brushstroke of timelessness. Here in a country whose population increases annually at more than three percent, these plains seem to defy history. Yes, there may be a few roads, a scattering of buildings at Seronera and Banagi, a grass airstrip here and there, but throughout 97 percent of the Serengeti, Man's hand is invisible. While across the border in Kenya, tourist minibuses are connected like link sausages as they encircle drowsy lions, here tourists are scarce and lions sleep unseen. On the Serengeti, one watches the evening storms brew in the highlands to the east, one listens to a dust devil scurry past like a departing spirit, one mistakes 100,000 wildebeests for the shadow of a cloud—and all the time one thinks, *This is how it has always been.*

From the oral tradition of the Masai we can extrapolate that during the 19th century the migration was very extensive, perhaps stretching farther north than it does today. But in 1890 there began what Sinclair describes as "a series of events of such profound ecological importance that the repercussions are still being felt today."

Ecological disaster a century ago

No one is certain as to how rinderpest, an Asiatic bovine virus resembling measles, entered Africa. One theory suggests it was introduced by General Kitchener in 1884 when he herded Russian cattle from the Black Sea up the Nile as relief for the imperiled General Gordon in Khartoum. Another, more promising theory suggests the disease was introduced by the Italians when they imported Indian cattle during their invasion of Abyssinia (now Ethiopia) in 1889. The virus changed the face of eastern and southern Africa; by 1896 it had virtually decimated all the cattle in the Cape Province, some 3,000 miles south of the Serengeti.

German explorer Oscar Baumann traveled through the Serengeti in 1891 and was struck particularly by rinderpest's effect upon the Masai themselves. He

wrote: "A crowd of tattered scarecrows, now typical of the Masai country, gathered outside the thorn fence of our camp. There were women reduced to walking skeletons, out of whose sunken eyes looked the madness of hunger, children resembling deformed frogs rather than human beings, warriors who could hardly crawl on all fours, and moronic, emaciated greybeards. These people ate everything available; dead monkeys were a delicacy for them; but they also devoured the skins, bones and even horns of cattle. . . . They were refugees from the Serengeti whose starvation had depopulated whole districts. . . ."

Baumann probably never knew the word "rinderpest" and, in all likelihood, he could not diagnose smallpox, one of the side effects of famine. It is now believed that 95 percent of all cattle in East Africa perished. About the same proportion of wildebeests, buffalo and, to a lesser extent, giraffes were also lost. Rinderpest recurred in 1917-18, in 1923, between 1938 and 1941 and finally in 1957-58. During this last outbreak, the Grzimeks began their historic flights across the Serengeti and estimated the wildebeest population at 99,480. They, too, were unaware that rinderpest had anything to do with the national park's population dynamics. In those days, the migration did not cross the border into Kenya. Still, the Grzimeks believed the migration, even when diminished, was one of the Earth's great wonders.

With rinderpest gone, wildebeests thrive

In 1962, after veterinarians had immunized cattle in the vulnerable areas at the edge of the park (the veterinarians' purpose was always the health of the cattle, not of the wild animals), rinderpest was virtually eliminated. Since then it has not been detected among the wildebeests of the Serengeti.

In 1962, wildebeest numbers were estimated at 250,000. By 1977, they had reached a peak of 1.4 million, a level that appears to be the capacity of the Serengeti-Mara ecosystem. Buffalo numbers also increased; but possibly because wildebeests eat and trample much of the buffalo's dry-season food, the buffalo population wallowed in the early 1970s while the wildebeest's continued to increase. In 1982, with veterinary services severely curtailed because of Tanzania's floundering economy, there was another outbreak of rinderpest, but apparently this time the disease was confined to buffalo.

Buffalo populations have declined further because of poaching, but there has been no trace of the rinderpest antibodies in blood samples from wildebeests. Possibly, commercial poaching on the outskirts of the park and drought conditions during the past three years are, in part, responsible for diminishing its

Spotted hyena has caught a crippled wildebeest and will soon have it helpless on the ground.

A male and a female lion tug on a dead wildebeest; they do not share prey peacefully as wild dogs do.

A white-backed vulture perches on the carcasses of animals that died trying to ford the Mara River.

population by up to 100,000, but such losses are not what really bother the scientists.

"The worst scenario I could imagine," says Borner, "is if rinderpest returned and reduced wildebeest numbers to, let's say, 250,000. That part would be sad, but not tragic, as far as I'm concerned. The next sequence would represent the tragedy because, no doubt, there would be human population pressures, particularly in the north, to claim those areas of the park no longer occupied by wildebeests. And if we lost those lands, then the migration as we know it now would never, ever, be seen again."

Once a year, Bernhard Grzimek returns to Tanzania to place flowers on Michael's grave and to visit the Frankfurt Zoo's many projects in the Serengeti. While he is in his late 70s, he has lost none of the enthusiasm he shared with his son when they flew transects across the then uncharted plain. Alan Root, the filmmaker, often joins Borner and Grzimek on these trips, flying daringly as Michael once did. Root feels that the Serengeti migration exists, in great part, thanks to Grzimek's resolve. "Say what you will—you and I and 100 others couldn't match the old man in what he's done for conservation. Nobody, in fact, can."

Nor is Alan Root being sentimental, for history relates that the Grzimeks drew attention to the migration. They were the first conservationists to use airplanes to manage game. On his German television program, Bernhard Grzimek exhorted his countrymen to visit the Serengeti. And, behind the scenes, with money raised from his wildlife programs, he helped create the Serengeti Research Institute—a facility that today is about to be reborn.

Most remarkable of all was Grzimek's success in influencing the Tanzanian government to preserve the

The sun has not set on the wildebeests, which still crowd the Serengeti Plain from horizon to horizon.

Serengeti. When he first met President Julius Nyerere, he recalls, the leader of Tanzania was baffled when told that Europeans would travel all the way to Africa merely to see an elephant. Today, nominally retired from office, Nyerere has become an ardent botanist and often he travels far just to see elephants. Not surprisingly, Tanzania, under his rule, contributed a greater percentage of the national income to parks than any Western nation. "At one time," recalls Grzimek, "the Tanzanian government relocated several villages just so the wildebeest migration would not be disturbed. Under the colonial administration, such a move would have been considered outrageous," he points out.

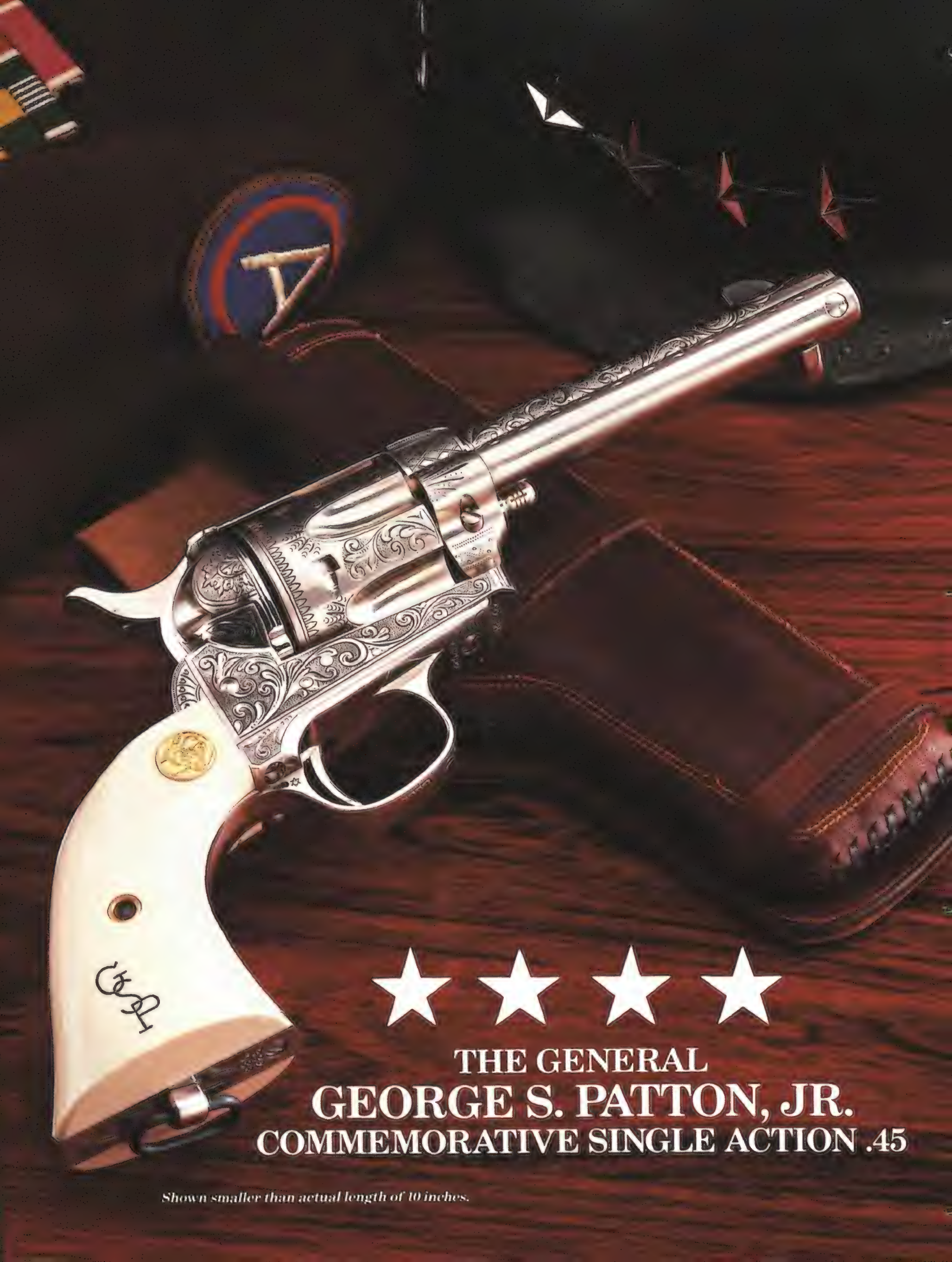
Asked to sum up his remarkable career, Bernhard Grzimek steadies his faded blue eyes on a distant acacia tree. "I have fought all my life not for wild animals, but to preserve living rooms for wild animals. Nothing more."

And the Serengeti today has come to be the very symbol of all such "living rooms." Flying east into steady rains with Alan Root, one is struck not just by that recurring sensation of timelessness, but also by the notion that Serengeti means more than just a plain in Tanzania. In the sub-Arctic, up to 400,000 caribou trek annually from calving grounds to wintering pasture. In a remote corner of the southern Sudan, possibly three-quarters of a million white-eared kob annually file one by one from the wetlands to grasslands. Only the wildebeests below our wingtips, however, conduct such extravagant journeys on land that is of immediate appeal to agriculturalists: Serengeti is an anomaly of our time.

"I think of lots of things when I watch them moving toward green grass," says Root in an answer to my question. "I think of early Kansas when three counties' worth of bison were so densely packed in the early mornings they formed their own cloud of fog."

I paused to look down at the great shadow of wildebeests massing toward new grass and another season of life. I, too, thought of all the other great migrations that are no more: the wildebeests in Botswana, the hartebeests in Kenya. But especially I thought, like Alan, of those millions and millions of bison moving out across the Great Plains in my own country. I recalled that by the year 1890 only 500 out of many millions remained. The farmers and the ranchers had won. It is good, I began to think, for us humans to know we haven't squashed one really epic last march. Ultimately, to watch another species forever bound for a new pasture has meaning far beyond the event: history still lives on the Serengeti.

Such scenes may be our last glimpse into the
Pleistocene, a time that is elsewhere forever gone.



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Klee's *Twittering Machine* was his wizardly way of combining polar worlds of biology and mechanics while exploring new sensibility of shape and color that came with creative post-World War I energy.

By Robert Wernick

A riddle within a mystery inside an enigma: Klee

Private collection, Switzerland

Klee's brush-and-ink self-portrait of 1911, when he was 30, reflects his interest in Van Gogh.

Sweeping show of the artist's provocative paintings offers a variety of insights and gets us slightly closer to a key to Paul Klee

Who could have predicted that out of Bern, that bastion of bureaucracy and banking, would come so venturesome, wayward and unclassifiable a figure, a monument in the daring canon of 20th-century art, as Paul Klee?

Klee's elfish wit has always made him a popular painter. The massive exhibition that is opening this month at the Museum of Modern Art in New York illustrates not only his fecundity (the 300 works here represent less than three percent of his total output) but his central position in the development of modern painting.

Klee is commonly thought of as a Swiss painter, but he was never a citizen of that country. He was born, raised and spent about half his life in Bern and died there, but his request for Swiss nationality was never granted during his lifetime. His father was a German music teacher. His mother, also a musician, was Swiss. He left Germany, where he had gone in 1898, after the Nazi takeover in 1933, when he came under attack by Hitler's National Socialist regime for representing what it chose to call Jewish-controlled degenerate art. His house was searched and he was fired from his job as professor at the Düsseldorf Academy. Klee sought refuge in Bern, where he lived for the rest of his life. When he was a young man beginning his career, he confronted the choice that all ambitious beginners then faced: whether to go to Paris or Munich. He chose Munich. His ways of thought and his ways of expression were always deeply rooted in German tradition. German thought, as Mark Twain and others have pointed out, is deeply influenced by the peculiar structure of the German language.

A painting, then, by Paul Klee is rather like a labyrinthine cul-de-sac German sentence with the final verb left out. It is constructed with the most precisely balanced relation of part to part. The eye of the viewer is firmly directed, sometimes with the aid of thick black arrows, from side to side, from center to edge, back and forth as line wriggles into line, color blends into color, all bound up into a seemingly logical structure. But what is the man trying to say?

If the message is ambiguous, it is not for any lack of effort to explain it. Klee filled more than 2,500 pages of notebooks with his theories of art, all neatly illustrated by diagrams. He cataloged virtually all his work, except for his academic drawings at art school and Bauhaus sketches. The catalog, which begins with drawings when he was four years old and ends a few days before he entered the hospital to die, lists more than 9,000 paintings, drawings and colored works. All but a handful of them have titles—titles which Klee regarded as an integral part of the work and which often provide a key for at least starting to understand them. The titles are a mixture of description and suggestion, and they are generally meant to startle. They can be broadly funny, as when what looks like a pin-striped banker in pink pajamas floating through a pink sky is labeled *The Creator*. At their best they have a delightful tingle of inevitability. How else could you possibly describe four birds, with their beaks open to heaven, perched on a wire attached to an insubstantial crank, than as *Twittering Machine* (opposite)?

A typical painting of the late 1920s is called *She Bellows, We Play* (p. 68). The "We" is fairly easy to interpret: a tangle of lines toward the center of the

Museum of Modern Art

Wildly fanciful, disturbing image, *Hero with the Wing*, was seen by Klee as a tragicomic figure.

canvas seems to represent a trio of frisky little dogs. The dogs are us; they stand for the whole human race as it dizzily plays out the game of life. Who, however, is "She"? Her role is a little less clear. "She" is a larger animal, vaguely bovine. She may be just a cow, but for someone steeped in mystical philosophies like Klee, she is more likely a sacred cow, perhaps some goddess like the Egyptian Hathor out of an ancient religion, and what she is bellowing would then be the precepts of divine law. But her relationship to the dogs is most uncertain. She has her back turned to them and could be sending out her message to the indifferent edges of the Universe.

If you step far enough back from this painting, both "We" and "She," drawn in thin black lines, tend to fade away until they disappear entirely in a pattern of transparent color patches—reds and blues and creamy grays—which seem to be gently receding and advancing in a kind of non-Euclidean space. Does this imply that, at the farthest levels of awareness, all things human and divine are swallowed up in an overall pattern that is undifferentiated and meaningless? Or is it simply, as some authorities maintain, that Klee's technique had not yet evolved to the mastery of his later years when he drew in thick black lines which swim in and out of the color patches like hieroglyphic signposts and there is no danger of any detail disappearing from view? The answer, as in most questions dealing with Klee, must be left in abeyance, in a mist of ambiguity. In the full context of Klee, one wonders if an answer is even necessary.

A harmony of opposites

Ambiguity was his natural element and he played in it the way a dolphin plays in water. He saw everything in terms of opposites trying to coexist. It was the artist's job to understand that every up implies a down, and to bring them together in some kind of harmony. "The demoniacal," he wrote in his diary, in the unfortunate oracular tone that infects the prose style of so many modern artists, "shall be melted into simultaneity with the celestial, the dualism shall not be treated as such, but in its complementary oneness. . . . For truth asks that all elements be present at once." He put it more engagingly in a lecture to his Bauhaus students in which he explained how lines of different character might be made to converge. He drew a firm, slightly curved line that had little loops at the ends, then he drew a random squiggly line twisting back and forth across it. This, he said in a totally characteristic comment, was "rather like the path of a man with a dog running free."

The orderly man and the anarchic dog might find their parallels in Klee himself, a blending of opposites.

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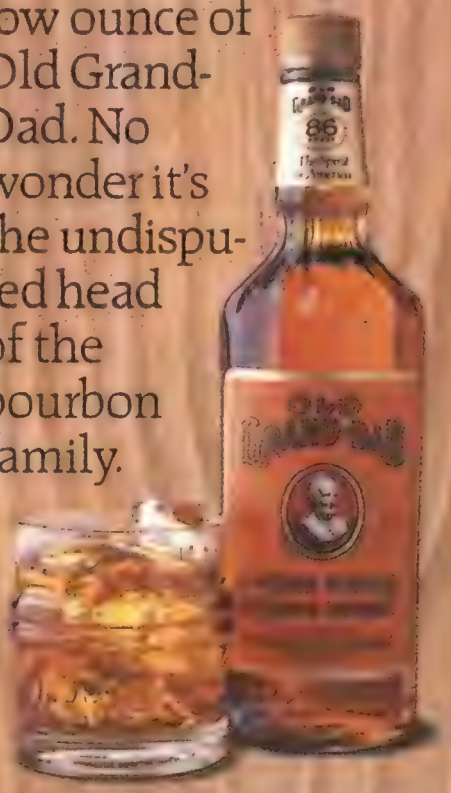

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Kunstmuseum Bern

Klee's painting *She Bellows, We Play*, a typical work of the late 1920s, is inhabited by some of his invented mythological creatures, with some ties to his mystical philosophic view of inner and outer worlds, all held in a suspension of color fields uniquely his own. A part of Klee's world is ambiguity, but usually in a playful way.

It is hard to believe that there are not two separate Klees looking out at us from his photographs. In some of them he is mystical and wild-eyed, vaguely Oriental —he did like to claim that he had Saracen blood—and this is the Klee who was so far-ranging, playful and unorthodox on canvas. In others he looks like a typically solid squareheaded bourgeois, Klee the good family man, the respectable, conventional citizen. "Shall I never lead any but an inner life?" he asked despondently in his diary; "As for outside, shall I always walk my way in discreet, average fashion?"

Nothing could have been more discreet and average than his life. There is probably not another modern painter who offers less anecdotal material to his biographers. He was a conscientious student who was briefly tempted by a musical career but preferred to become a conscientious painter. He worked at his art virtually every day of his life. He traveled to Paris, Italy, Tunisia, Egypt. He spent almost three years in uniform and he was a dutiful, if bored, soldier who noted that he was a better marksman standing up than lying down, when his helmet got in his way, but the nearest he got to action was painting camouflage on airplanes. He taught school for ten years. He never joined a party and never took part in any overt political activity. In his voluminous diaries, external events flow on in a kind of unaccented grayness: Klee goes hiking in the Alps, Bulgaria collapses, a friend's wife commits suicide—the tone remains the same.

In his early days in Munich, Klee appears by his own account to have investigated sex with the same conscientious assiduity that he later applied to the theory of colors. But once he married the pianist Lily Stumpf and settled down, he was a model of middle-class monogamy. His son, Felix, remembers how in the early days, when Lily was supporting them with her music lessons, he would go trotting along with his father to do the shopping. And his father would do the cooking, too, sometimes stirring the soup abstractedly with paintbrushes.

He liked his little jokes, and there are photographs of him clowning for the camera. He was also a learned man who read the Greek tragedies in the original. He formed friendships with many of the leading painters of his generation: Wassily Kandinsky, August Macke, Robert Delaunay, Franz Marc. The death of Marc at Verdun struck him, he said, like lightning. But when he came to write down his feelings about this closest of friends, Klee sounds curiously detached. "His noble sensuousness with its warmth attracted many people to him," he wrote in his diary, and went on immediately to speak of his own lack of any such warmth: "What my art probably lacks is a kind of passionate humanity. I don't love animals and every sort of creature with an earthly warmth. . . . In my work I do

Robert Wernick wrote on the transcendent art of Fra Angelico in SMITHSONIAN*'s December 1986 issue.*

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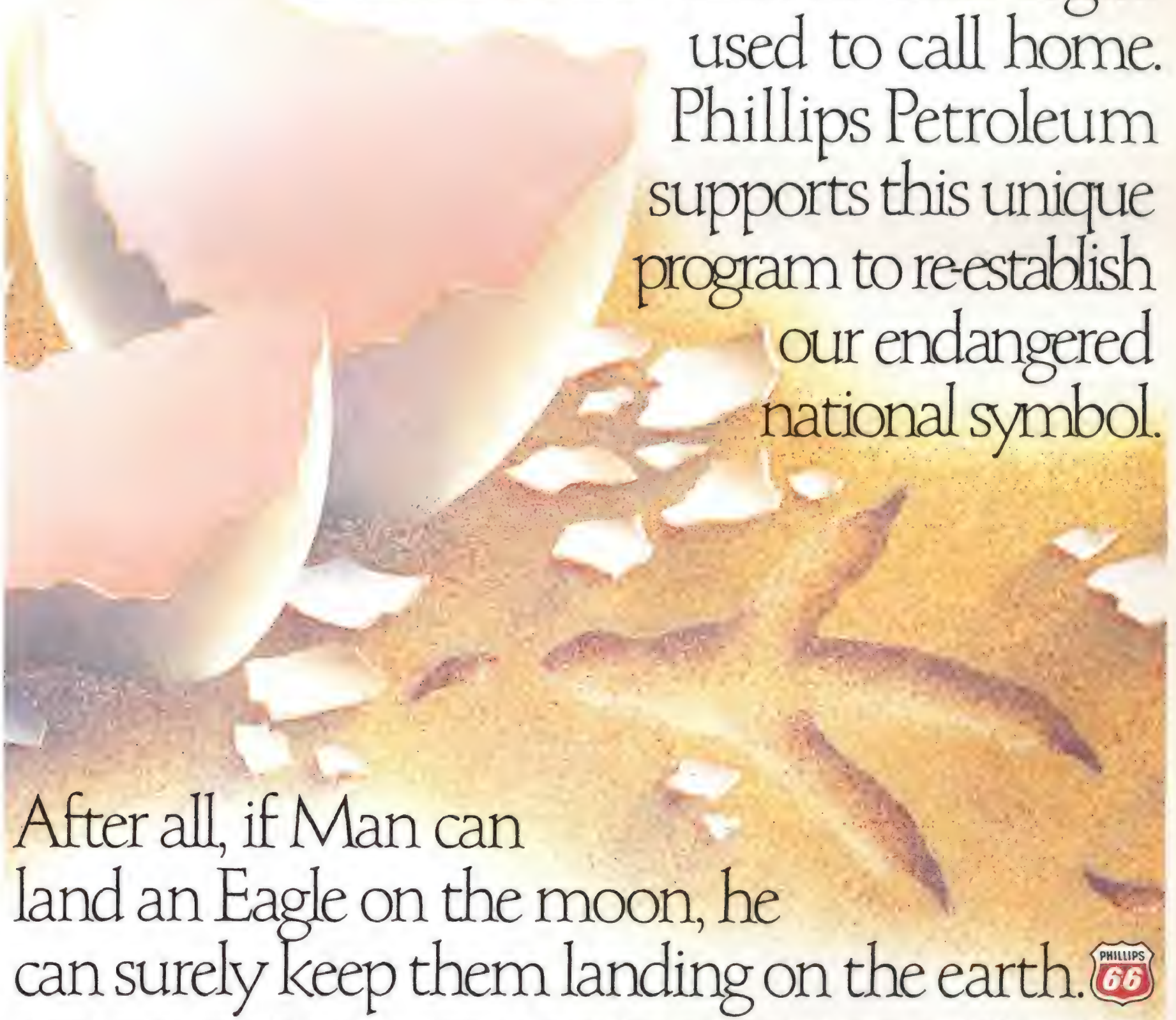

After all, if Man can land an Eagle on the moon, he can surely keep them landing on the earth.

PHILLIPS 66

For more information, contact the George Miksch Sutton Avian Research Center Inc., P.O. Box 2007, Bartlesville, OK 74005, (918) 336-7778.

not belong to the species, but am a cosmic point of reference."

While the outer Klee was going about his Earthly duties—supporting a family, signing contracts, cannily judging the art market, preparing lectures for the Bauhaus—the inner Klee remained at that cosmic point of reference. It was a perfectly natural place to be for someone like Klee, who was well-versed in German literature and felt a special bond to the writers of the Romantic school who flourished and suffered in the early years of the 19th century. Like them he believed in a universal duality, and like them he lived in a perpetual tension between the *Diesseits* and the *Jenseits*, the Hither and the Yon. The *Diesseits* is the sorry stuff we see outside our window, the "sticky mud of the world of appearances." Out yonder is another brighter world, the one where the chaos of appearance rearranges itself into a higher reality, in a blaze of total affirmation.

The *Jenseits* is obviously the better place to be, and the true romantic is suffused with a lifelong longing to get there. But how can he ever do it, given the contradictions of his nature as a man, his combination of "impotence of body and nobility of spirit"? Klee expressed the dilemma in an early etching, *Hero with the Wing* (p. 66). The hero stands, noble and bearded, on a pedestal, like a national monument, and he has a great, glorious wing rising out of his right shoulder. Unfortunately, not only is his left side wingless, but his left arm is broken and held in place by a pitifully thin sling. He may cut a ridiculous figure to the outside world, but he has to fly.

Most romantics tend to head off helter-skelter for the *Jenseits* and disappear in murky clouds of nonsense. Klee, however, liked to think of himself as a "cool Romantic," who never lost sight of his true condition. Whatever his longing to escape, he remained in contact with the sticky mud of the *Diesseits*. Jürgen Glaesemer, who as curator at the Kunstmuseum in Bern is in charge of the greatest collection of Klees anywhere, notes that Klee could have come across, in the works of Jean Paul Richter, a sketch of an ideal character called the Humorist. Richter compares the Humorist to a bird in Greek mythology, the merops, who could fly upward like other birds, up into the mysterious cosmos. But it flew backward, so that its eyes were always fixed on its home, the Earth.

As Glaesemer points out, Klee was just such a Humorist. In his meropsian flights into the Yon, he never lost sight entirely of the Hither. "Do not quite leave this world behind," he said to himself in his diary in 1905. "Imagine you are dead; after many years of exile you are permitted to cast a single glance earthward. You see a lamppost and an old dog lifting his leg against it. You are so moved that you cannot help sobbing."

The man who had seen that old dog could never become a wholly abstract painter. He worked with lines and shapes and colors, but lines and shapes and colors as he maneuvered them into place tended to take the form of objects—suns, moons, feet, fish—or to suggest objects. And these objects, he said, bring a baggage of human feeling with them; they look out at us "serene or severe, tense or relaxed . . . suffering or smiling." Even paintings with no observable subject, which at first glance are no more than a mass of squarish colored spaces, take on a physical presence: they look like stained-glass windows or animated checkerboards. He may create a work which consists almost entirely of two columns of interlocked and superimposed trapezoids and triangles. He adds a circle at the top and tiny angles at the bottom, which are hands and feet; the painting is full of the energy of a passionate human conflict that justifies its title, *Dispute*.

Observations into art

Klee's early satirical drawings reveal him as a very sharp observer of the *Diesseits*. The process of getting his observations into what he could consider a final work of art involved a sequence of profound transformations. He compared this process to the growth of a tree. First come the roots; this is when the artist perceives some sense of order in the "passing stream of image and experience." The trunk is the artist's vision, through which the sap flows from the roots. The work of art is the crown of branches and leaves which unfold to the world.

No one would expect the crown of the tree to be a mirror image of its roots. And therefore, said Klee, the people who accused him of incompetence and deliberate distortion didn't know what they were talking about. He had studied in academies for years and was,

Private collection, Switzerland

Above: Untitled work was on artist's easel when he went to sanitarium in May 1940. He died in June.

Kunstmuseum Basel

At right: The symbols are clear—a humanoid figure and centralized keyhole-shape spell *Locksmith*.

Philadelphia Museum of Art

A sense of sea, space and mystery pervade this tapestrylike painting, *Fish Magic*, of 1925. At time, Surrealists were much in evidence in Paris. Although Klee was not a group member, work like this had wide appeal there.

Kunstmuseum Bern

Undulating patches of color stamped on lines, dots without end, a pyramid in an imagined nightscape, go to make up *Ad Parnassum*, 1932. The name may derive from a baroque treatise on musical counterpoint.

as a matter of fact, an exceedingly skilled draftsman. But he had no use for the mere skillful copying of surfaces. He preferred to draw as children or madmen draw—ideas rather than any particular member of the species. He himself had been a very precocious child artist and some of the drawings he did in his preschool years must rank among the most remarkable works of their kind ever done. *Family Outing*, which he did when he was four years old, is a typical child product in one sense: it is a linear rendition of a family—father, mother, older sister, younger brother, doll—out for a skate on the ice. The eye for detail, like the bustle on the mother's dress, is quite unusual. Still more unusual is the formal friezelike arrangement of the figures, and even more so is the air of unease, if not of menace, that hovers over the scene and finds its dramatic accent in the father's huge, clawlike hands poised to spring behind the children. This is the work of a very sophisticated, sharp-eyed, witty, slightly malicious child—a miniature Paul Klee, in fact.

Drawing like this was only one of the paths to the *Jenseits*. In his uncompromising methodical way, Klee spent years studying all the possible ways of combining, dividing, comparing and contrasting lines. He spent more years studying the ways of shading to replicate every kind of three-dimensional shape. He did not call himself a painter until a visit to Tunisia in 1914, when the discovery of Mediterranean light introduced him to the world of color. He then spent years studying the possible relationships of all the colors in the spectrum. During all these years, he was ceaselessly experimenting with different techniques and different materials. He painted on canvas, he painted on glass, on burlap, on plaster, on newspapers, on wrapping paper, on old tiles fished up out of the river. He painted sharp, he painted blurred. He could change styles from picture to picture because he was not trying to create style. His program, and for a modest man it was an incredibly ambitious program, was to lay down the laws of art that would fit any style.

He looked at the art being produced in the 20th century and he found great talent, but also great con-

fusion. Painting was in the state that music had been in at the start of the 18th century; it lacked a firm theoretical base on which to build. Such a base had been given to music by works like Bach's *Art of the Fugue* and Johann Fux's *Gradus ad Parnassum*, the textbook from which Haydn and Mozart learned their musical grammar. Bach and Fux had laid down the laws for polyphony, the weaving together of independent voices or melodies to provide ongoing harmonies. Klee, who was steeped in music from the cradle, who played the violin all his life, wanted to find a visual equivalent for Bach and Mozart, a "higher polyphony" that could combine formal perfection with a deep emotional resonance.

Art as a field of energy

There is an obvious difficulty in applying a musical concept like polyphony to painting. Music exists in time, it moves on from chord to chord and rest to rest, while a painting is a static object fixed for all time on its canvas or its wrapping paper. But Klee did not want his paintings to be static objects at all, something that could be taken in at a glance. He wanted them to be dynamic, a field of energy and purposeful activity where the eye of the observer would be kept busy following the hand of the artist. In the Klee type of painting, the process of painting was more important than the painting itself; or as he put it, "Formation determines form and is therefore the greater of the two." By properly placing his shapes and colors, by subtly mixing correspondences, reflections, resemblances, recapitulations, he could set up rhythms that could "bring the ego and the object into a resonant relationship that goes beyond optical foundation."

Klee was an artist who, though he sold well and achieved critical acclaim for the last 20 years of his life, was generally regarded as a peripheral and somewhat eccentric figure. Unlike Picasso or Matisse, or his friend Kandinsky, it was largely after his death that he began to be hailed as one of the central figures of modernism. As the show at the Museum of Modern Art makes clear, his influence has been enormous. There is hardly an innovation or an aberration in the art of the past 50 years, whether minimal or gestural, constructivist or expressionist, op-ish or pop-ish, which does not turn up full-grown in Klee paintings done many decades before, neatly concentrated in the small formats he favored.

While numerous artists have studied his work for ideas, it cannot be said that Klee ever started a school. For behind the ponderous theorizing and the musical analogies stands a unique personality with a unique vision. From Paleolithic times down to the present, artists have journeyed to the *Jenseits* and returned to tell us what it is like out there, but none of them has brought back a report remotely resembling Klee's.

Many groups and schools have tried to adopt him. The Dadaists hailed him as one of their own because they thought his work subverted all traditional and rational standards. The Surrealists praised him for finding a shortcut to the unconscious mind, which was for them the center of wisdom.

He taught for ten years at the Bauhaus. His pupils idolized him; they regarded him as some kind of Buddha. And he seems to have got on well enough with the staff there, though it is hard to imagine a squarer peg in a rounder hole. The founder of the Bauhaus was Walter Gropius, whose philosophy appears in caricature in Evelyn Waugh's *Decline and Fall* as Professor Silenus, an architect who sees the central problem of all art as the "elimination of the human element from the consideration of form." The masters of the Bauhaus did eventually succeed in fitting a portion of mankind into concrete boxes. ("The only perfect building," said Professor Silenus, "must be the factory, because that is built to house machines, not men.") They must have approved of Klee for his diagrams and analyses, and for the problems he set for his

Collection Rosengart, Lucerne

The title is also the key to this abstract arrangement of shape and color: *Mountain Village (Autumn)*.

students in analytical geometry and spherical trigonometry. But Klee lived in a different universe. The more precise the musical and mathematical formulas he devised for his work, the more the work itself took off in bizarre and unpredictable directions. In the giant machine shop that was the Bauhaus, Klee's was a twittering machine.

Klee's self-portraits are ironic and self-deprecating, partly because he felt very keenly the isolation of the modern artist, working alone in his studio, deprived of the recognized role and place in society that artists of previous ages took for granted. "*Uns trägt kein Volk,*" he said in a famous lecture at Jena in 1924, which has been translated, "The people are not with us." But he proudly added in the next sentence, "We seek a people."

Reaching a people must imply expressing some of the "highest lyric emotions" of which he spoke. Yet emotion is about the last word that occurs to people looking at a Klee. For most of his career he was the coolest of romantics, observing human striving and longing with sympathy, but from a vast meropsian distance. Only rarely does some passion break through to the surface of a work, as it does in *Stricken from the List*, a face with an "X" drawn brutally across it, that summarizes the hopeless desperation of people (Klee was probably thinking of "degenerate artists" like himself, but it could apply equally to Jews—or any other victims—who were being hounded by the Nazis after Hitler took over Germany in 1933).

The amazingly fruitful last years

Only in the late 1930s does a new intensity of feeling creep into his work. These were also the years in which he was dying of scleroderma, a devastating disease which turned his skin into a kind of armor. By 1939 he must have known he was doomed. In the year and a half remaining to him—he died in June 1940 as Western Europe was being engulfed in war—he crowded in an amazingly copious and varied output, as if he were collecting all his baggage for the great voyage: more than 1,650 paintings, drawings and colored works all told. Many of them are full of premonitions, of his fate and the fate of the world. There are disconcerting figures called "Angels," who are certainly not messengers of happy tidings. *The Kettledrummer*—death, the drummer—looms with a single menacing eye and an arm raised to strike the note of doom. *A Doll on the Road* lies, limbs askew, one eye twisted vertically, as if to indicate that all of nature is out of whack. The *Destroyed Labyrinth* is just that, dark red fragmentary shapes on a lighter ground, a complex order reduced to chaos. *Death and Fire*, dated 1940, with its whitish head awry, outlined with thick black strokes against a muddy background, might stand as a curtain raiser for the years of horror ahead. His *Aurochs* creatures with their heads low, doomed to extinction, might foretell the fate of Homo sapiens.

But interspersed with paintings like these are others that are full of lively fancy, a positive gaiety. One is called *Exuberance*. Within a brief period of time he could turn out a painting with an exceedingly gloomy blue moon, and another with a radiant beige moon shining on a set of smiling biomorphs. As he approached the end, the creative process speeded up, he raced from medium to medium and mood to mood as if he were trying to pack all he had ever learned and felt into a last series of statements. If the statements appear to be contradictory, it is because it takes a

Painted on newspaper, *Insula Dulcamara* was Klee's largest work, measuring about 34 by 69 inches.

Kunstmuseum Bern

flight into the *Jenseits* to understand them fully. "In the here and now," he said, "you cannot grasp me."

The paintings increased in size in this final phase. The largest one he ever did (still a modest size by contemporary standards, 34 by 69 inches), was done about a year before his death. It is called *Insula Dulcamara* (below), which means bittersweet island, and it is clearly a meditation on his approaching end. Its color patterns and its odd, undefined, undirected shapes drawn in thick black lines keep a perfect balance between melancholy and gaiety. The biggest of the shapes is presumably the isle of the dead (but it might be a sea serpent risen from some mysterious deep). Is the boat at the upper right bringing souls to the isle or is it ferrying them off to a farther sphere? Is the vaguely human figure on the shore, with its suspicious resemblance to the letter "P," Paul Klee himself? And what does the figure "1" in the foreground stand for? Perhaps it is a proclamation of the endurance of Number One, the individual human ego. Or perhaps, like the hero with one wing, it is meant to be pathetic and slightly ridiculous, a claim of unity in a cosmos where nothing really hangs together. A painting by Klee automatically calls up such speculations, along with a realization that there is no one answer. Whatever message may be here is drowned in the visual delight of following the objects, tense or relaxed, suffering or smiling, as they swoop and swirl around the artist's field of vision.

She bellows. We play.

Title and the images it evokes are a play-off of opposites. In Latin, *dulcis* means sweet, while *armarus* means bitter. Some critics have seen the 1938 work as a meditation on approaching death.

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Anchoring the corner of Pennsylvania Avenue at 14th Street, latest incarnation of the Willard regains its 1904 appearance. Skillfully designed simpler addition to the left has offices, shops, restaurants.

By Dorothy Ames Marks

A stately Willard proudly receives guests once more

Having welcomed the great and near-great to Washington for 140 years, the grand hotel is taking right up again, thank you

Jenny Lind Suite (under flagpole, opposite) honors "Swedish Nightingale," overlooks unmistakable view.

If you check into the handsomely restored, newly opened Willard InterContinental Hotel at 14th and Pennsylvania Avenue in the nation's capital these days, you won't find Ulysses S. Grant's favorite leather chair behind a screen in the lobby. That disappeared some years before Joseph E. Willard built the "New Willard" from 1901 to 1904. And the bronze tablet that commemorated Julia Ward Howe's writing "The Battle Hymn of the Republic" while a guest at the hotel in 1861 is gone, too. That was sold at the auction of souvenirs when the hotel, falling on bad times, shut its doors in the summer of 1968.

But make no mistake about it, if Mark Twain or Teddy Roosevelt or Buffalo Bill Cody were able to return and walk through the new New Willard of 1986, they would feel very much at home.

There in the faithfully re-created lobby are reproductions of the seals of the 48 states looking down from the ornate ceiling onto the original petal-shaped registration desk. Old Peacock Alley—all 189 feet of it—still stretches from Pennsylvania Avenue to the F Street entrance. And in the handsomest of the reception rooms, the Crystal Room, more than 5,000 prisms glisten on each of the eight period chandeliers. The oak-paneled Willard dining room with its red-velvet draperies is a meticulous reproduction of the room where Presidents and notables were regaled in years past.

The facade of the restored hotel retains the French Second Empire Beaux-Arts architecture of the 1901 Willard. But, in the interest of making the $113 million renovation economically viable, four matching pavilions have been added that hide, behind their simplified Beaux-Arts exteriors, a modern office-and-shopping complex to complement the 365-room hotel.

Patrons of the old Willard will be familiar with the two bronze plaques outside the new Pennsylvania Avenue entrance. One commemorates the peace convention held at Willard Hall in 1861, chaired by former President John Tyler, when delegations from 21 states met secretly for three weeks in a vain attempt to head off the Civil War. The other celebrates the opening of the New Willard of 1901 and lists a few of the Presidents and other famous persons who have stayed at hotels on the site dating back to 1818.

Already, the Willard is reliving a part of its past. Before Blair House was made the federal government's official guest house in 1942, the Willard often served as an unofficial guest house for visiting dignitaries—David Lloyd George and the late Prince of Wales, later Edward VIII, both stayed there, for example. Now Blair House is closed for renovation, and so last September the President of Brazil and his party were put up at the hotel, even though it had not yet had its formal opening. The Queen of Spain, in town for the premiere of Gian Carlo Menotti's opera *Goya*, was lodged at the Willard in November.

This, then, is the story of a "residence of Presidents," but it is also the story of Henry Augustus Willard (1822-1909), who, with his brother Joseph Clapp Willard (1820-97), created Washington's grandest ho-

Color photographs by Carol M. Highsmith

tel. Henry came from an illustrious family. The first Willard in America helped to found Concord, Massachusetts, in 1635. One forebear defended the witches at Salem, another was president of Harvard College and still another was a ringleader of the Boston Tea Party. Henry's own father, though, was a hardscrabble Vermont farmer, the sire of five boys and two girls; and so, at 16, Henry was already clerking at Captain Chase's Tavern in nearby Brattleboro.

While still in his teens he moved on to become the dining-room steward on the *Niagara*, a steamer plying the Hudson River between Troy and New York City. Ambitious, gregarious, good-looking and apparently something of a workaholic, young Henry not only set a fine table, but provided his passengers with extra amenities. He drew a map for them so they could identify the points of interest en route. Out of his own funds he set up a circulating library.

Such ingenuity attracted the attention of a frequent passenger, Phoebe Warren, the fiancée of Benjamin Ogle Tayloe, of an old Virginia family. Young Ben owned a hotel in Washington—40 rooms in a half-dozen wooden houses two blocks from the White House. Several managers had come and gone and he was ready to make further improvements if Henry would come down and manage it.

Now Henry had been in and out of grand hotels in New York—his brother Joseph had clerked at the famous Astor House there—and he had large ideas. So in 1847, 25 years old, he arrived and soon persuaded his eldest brother, Edwin, to join him. Together they worked with Tayloe to unite the two-story-plus-attic houses behind a brick facade to create more than 100 rooms and suites.

Unfortunately, as sometimes happens, the two brothers didn't see eye to eye, and Edwin soon went off on his own. Henry then persuaded another older

Feted at 1859 ball, British Ambassador Lord Napier, his lady, guests supped late and danced till dawn.

Office-seekers like these haunted Willard lobby, causing U. S. Grant to denounce them as "lobbyists."

brother, Joseph, who was digging for gold—unsuccessfully—in California, to seek his fortune in Washington. The going rate for room and board was $2.50 a day and business was good when Congress was in town. When it went home, the town collapsed like a spent balloon.

Boarding houses and hotels played an important role in early Washington. Congressmen, their staffs, lobbyists and hangers-on all came without their wives, bedded down in hostelries clustered around the Capitol and enjoyed the bonhomie of taverns in the evening. A British visitor of the 1830s called Washington "one big tavern." Under its earlier managers Tayloe's hotel had attained a certain cachet when Congress held a dinner there in 1825 for the Marquis de Lafayette and again when the General Post Office briefly set up shop there in 1836. Samuel F. B. Morse, the young painter turned inventor, had given it more visibility when he used an elm tree out front as his headquarters to lobby Congressmen on behalf of his telegraph. Charles Dickens stayed there in 1842 and apparently hated every minute of it. After all, he had stayed at America's first "palace" hotel, the Tremont in Boston, and had commented favorably both on that city and the hotel. He was unprepared for the raw village he found on the Potomac. He called Washington the "headquarters of tobacco-stained saliva," complained of the mud and pigs and chickens in the streets and of the barking dogs and the servants lounging in the hotel courtyard. This "City of Magnificent Intentions," he predicted, would remain as desolate and unfinished as it then appeared to him.

A groaning board with a watchful host

Meanwhile, at the hotel, Henry was devoting himself to getting business, while Joseph, a quiet fellow with a head for figures, kept the accounts. At 3 each morning Henry went to the Center Market at 8th Street to buy fresh foodstuffs. And at each mealtime he carved the meats himself to prevent wastage. As early menus show, Henry's table groaned under a surfeit of fish and game and meats and as many as 16 side dishes. He decided early—and wisely—however, that attracting important guests would prove an even better lure for the newly named Willard's City Hotel.

Fortune struck in 1850 when Phineas T. Barnum brought Jenny Lind, the "Swedish Nightingale," to Washington and Willard's. President Millard Fillmore and his Cabinet called on her. She held a crowded levee at the hotel. She was entertained at the White House. The city sent a band to serenade her.

Barnum, of course, had wanted Jenny to sing at the Capitol, but Congressional rules wouldn't permit. Meanwhile, with Henry's help, the brother who had

Known as "Willard's" in mid-1870s, the hotel, neat but not gaudy, presided over a somnolent scene.

In middle age, Henry A. Willard, founder of hotel dynasty, exuded forcefulness and determination.

left him—Edwin Willard—had found a local businessman to stake him in a rush job to restore the burned-out National Theatre on E Street, a half-block from Willard's, in time to receive the "Sweet Ambassadress of Song." Edwin and his partner had managed to squeeze in 3,500 seats, a number that barely got by the fire marshal. Although tickets were priced from $3 to $7—very high for the day—every seat was taken. The President and most of his Cabinet attended both concerts. Fillmore later joked that Jenny's visit was the high point of his Presidency.

At her second concert, the singer brought down the house with her rendition of "Hail, Columbia" (in his cups, the aging Daniel Webster insisted on singing along from his seat) and popularized for all time a little-known song entitled "Home, Sweet Home."

In addition to entertaining his illustrious guests, Henry was continually trying to upgrade his hotel. When President Pierce installed the first bathtub with running water, lavatory and water closet in the White House, Henry promptly ordered a matching set. He claimed to be the first Washington hotel man to put stationery in his guests' rooms; Julia Ward Howe scribbled the words to "The Battle Hymn of the Republic" on a piece of Willard's Hotel writing paper.

It could be said for Henry Augustus Willard that it was a case of the right man in the right place at the right time. By 1855 the population of Washington had reached 50,000 and the town boasted ten hotels capable, it was reported in the press, of accommodating 2,470 guests. More Congressmen were bringing their families to Washington and settling in. Vice Presidents —when they were in town—routinely stayed in hotels.

And, according to information recently confirmed by Katharine Zadravec, a consultant at the Folger Shakespeare Library, 1855 was also the year the reclusive Amherst poet, Emily Dickinson, and her sister spent a quiet three weeks at the Willard visiting their father, a one-term Congressman.

Though concentrating on the road to fame and fortune, Henry found time to marry his hometown sweetheart, Sarah Bradley Kellogg, daughter of a Vermont judge. He was still handling every detail of the hotel's management. Writing in a letter to her grandfather, Sarah explained: "We are all very busy making carpets. Henry cuts and plans everything and we all sew as fast as possible."

In 1859 Henry decorated the hotel with scores of flags, British coats of arms and portraits of Queen Victoria and George Washington for the largest private ball ever held in the city, in honor of retiring British Ambassador Lord Napier and Lady Napier. Even the august *Atlantic Monthly* sent an artist from Boston to record the crowded ballroom scene of 1,800

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dancers, who included Jefferson Davis, Sam Houston, Stephen A. Douglas and banker W. W. Corcoran. It was, says Garnett Laidlaw Eskew in his 1954 book *Willard's of Washington*, the last occasion on which Northern and Southern leaders and their ladies were to mingle in friendly fashion.

In 1860 Willard's was very much in the news again. A Japanese delegation, 76 strong, arrived for almost a month's stay. It included two ambassadors and other diplomats, an official witness, three doctors and a legion of sword bearers, cooks and other servants carrying 80 tons of luggage. They had come for the very important signing in America of treaties opening Japan's ports to U.S. trade.

Henry built them a special kitchen, made three private dining rooms available, preempted the ladies' entrance to the hotel for their private use and gave over the entire second floor along 14th Street to the delegation. And each day the hotel coped with 500 or more sightseers eager to catch a glimpse of the exotic assemblage, with their shaved crowns, fluttering fans and colorful costumes.

The diary one Japanese visitor kept is explicit in his wonderment at the hotel's plumbing—so "different"—and the solitary bathing habits of Americans. In regard to the ladies, whom the Japanese were surprised to see included at official functions, one entry reads: "Ladies of this country are all fair-complexioned . . . although we are getting accustomed to their appearance, we find their reddish hair uninteresting as it reminds us of canines' eyes."

The local press had a good time with the experience of one Japanese who, failing to find the wooden box or ceramic block commonly used by the Japanese for a pillow, preempted for the purpose the chamber pot he found under his bed—and slept soundly.

By 1861, Henry Willard was a Republican supporter and a confirmed Union man who regularly flew the Union flag from his flagstaff. Northern sympathizers swarmed to the hotel. When Southerners came, they used the F Street entrance.

So when, because of widespread assassination threats, detective Allan Pinkerton brought President-elect Abraham Lincoln secretly into Washington—ahead of his family and at dawn—Willard's was the chosen destination. In Parlor Number 6 and in the lobby, over the next nine days, he met frequently with his Cabinet and Secretaries. Among souvenirs of the Lincoln years are Willard's Hotel bills on which he scrawled pledges that he would personally pay the bills of Union officers staying there if the government refused to honor them.

In the midst of gathering war clouds, the visit of another of P. T. Barnum's protégés in 1861 was a welcome diversion. "General" Tom Thumb and his tiny bride were honored with a special Willard's "Hop" and entertained by Mrs. Lincoln at the White House. Henry thoughtfully had a special ladder built so they could climb into the bed in their large third-floor suite.

As release from the anxiety and grief of the Civil War, Washington resorted to a kind of hectic gaiety. With thousands of soldiers and civilians pouring into the city, Willard's was housing as many as a thousand a night, sometimes three or four to a bed. The breakfast hour began at 5 A.M. and supper ran to midnight with sometimes 1,500 or more persons being fed. Cost for room and board had skyrocketed to $4 a day.

In 1865, *The Stranger's Guide to Washington* warned newcomers to avoid the south side of Pennsylvania Avenue (pickpockets, prostitutes and con men abounded) but advised: "To see society, go to the Willard's Hops."

Confederate spy to Yankee bride

By this time, Henry and Joseph were millionaires—and more. In 1861, they turned over day-to-day operation of the hotel to a management company. Henry and his family spent the war years in Hudson, New York, returning to Washington in 1868. Meanwhile, Joseph, the man of accounts, had found romance. Serving on Union General McDowell's staff, the 42-year-old captain met beautiful 21-year-old Antonia Ford of Manassas, Virginia, who was later imprisoned as a Confederate spy. At the war's conclusion, the story ended happily at the altar and a son was born. But Antonia, possibly from ailments acquired during her imprisonment, died in 1871 and the grieving Joseph became a recluse, estranged even from his own family.

In 1870, after protracted negotiations, Henry and Joseph had bought out Tayloe for $22,500. Through the difficult Reconstruction period, through the Panic

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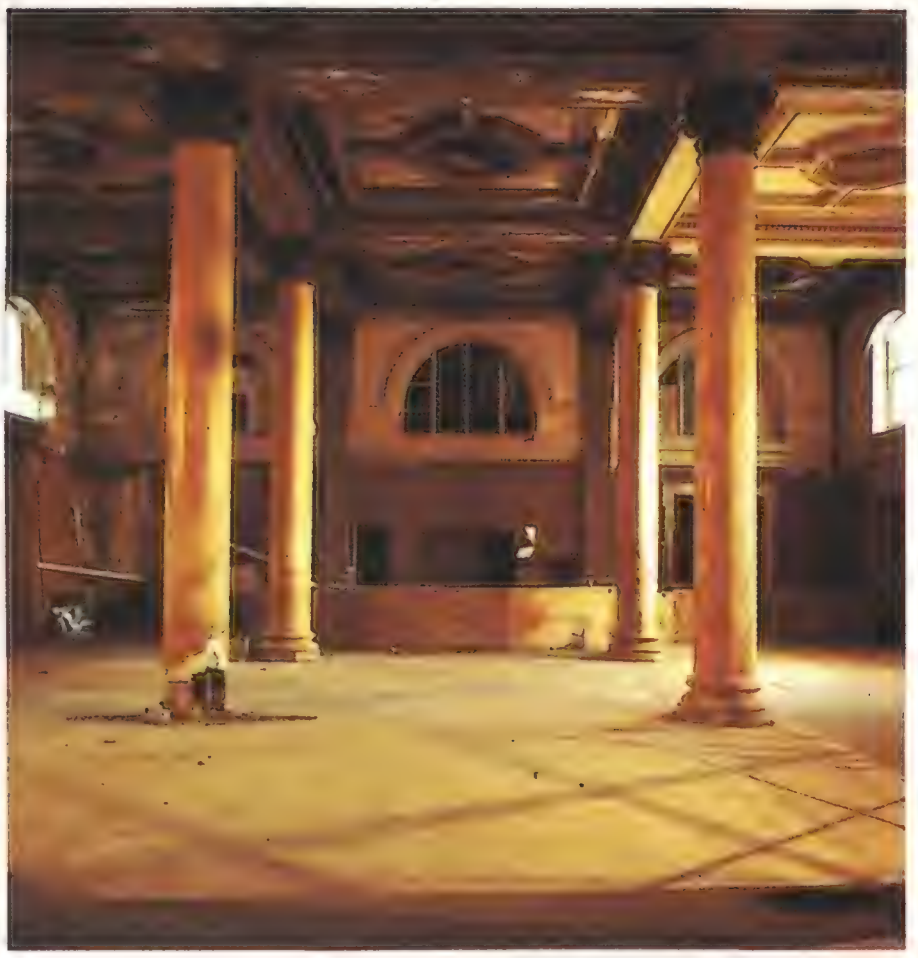
Frances B. Johnston's early 1900s photograph of "New Willard" lobby was valued aid in recent restoration.



Cleared of debris before resuscitation began, dismal scene reveals disrepair; rats chased photographer.

of 1873 and the hectic year of the 1876 Centennial celebrations, the hotel continued to prosper. In 1873 and again in 1883, major improvements were made—more elevators and baths, a larger barber shop, a billiard room and a nursery were added (children were not allowed in the dining room). And from 1867 on, Willard's ballyhooed the first "ice-cream soda in Washington." The hotel now had its own *Guide to Washington*, which assured guests they need not fear malaria within its walls or the "poisonous sewer gas."

Mary Cable, in her 1969 book *Avenue of the Presidents*, writes that by 1890, a suite of rooms, American plan, at the Willard could run as much as $600 a week, well beyond the reach of most Congressmen. And competition from new hotels was hurting.

Presidents-elect were no longer routinely checking in at the Willard, but the Gilded Age brought another type of business. Queen Liliuokalani of Hawaii came with a large retinue to lobby for the return of her throne. The most newsworthy guests were Baby Doe and her "Senator." The story of Baby Doe and Horace Tabor has been immortalized in Douglas Moore's best-known opera, *The Ballad of Baby Doe*, in which 50-year-old ex-grocer Horace, a married man and owner of Leadville's Matchless Silver Mine, a "lop-eared cutthroat from a squatter's claim . . . and a panhandlin' man," falls for young divorcée, blond, adorable—"like a fluffy kitten on a satin cushion"—Baby Doe.

In January 1883, the Colorado State Legislature elected Tabor to fill out a 30-day unexpired senatorial term. His darling Baby Doe's dream was a proper Catholic wedding with all of official Washington there. The Willard was the chosen locale, and hundreds of silver-engraved invitations were sent out. One snooty senator's wife returned hers torn in half.

When the big day came, on March 1, 1883, Baby Doe was resplendent in $7,000 worth of wedding gown and lingerie, according to the *Washington Evening Star*. There were enough flowers for several funerals, including a six-foot-tall centerpiece surmounted by a wedding bell of white roses. President Chester A. Arthur, one member of his Cabinet, ten senators and six congressmen attended, but the wives stayed away in droves. And when the priest learned he had married two divorced people, he sent back his $200 wedding fee and threatened to have the marriage annulled.

Unhappily, the last decades of the century found the Willards quarreling over boundary lines and oral agreements made earlier with regard to division of their holdings. At auction in 1892 Joseph outbid his brother's son, Henry K. Willard, to whom Henry A. had conveyed his interest in the hotel. But the elder Henry did not remain out of innkeeping—in 1906 he built the Occidental on a narrow piece of land that he

Resplendent once more, lobby glows in light from chandeliers modeled on originals; the furnishings are authentic to early 1900s. Mosaic floor was repaired with Siena marble; carpets were woven in England.

still owned next door to the Willard. Its restaurant, with a picture gallery of famous people, was to become world famous—and incidentally, is open once more, complete with picture gallery, in one of the pavilions adjacent to the hotel.

In 1901, Joseph Edward Willard, son of Joseph Clapp Willard, realized a longtime dream: the "town's first skyscraper hotel," with the largest local ballroom, was opened. The New Willard was the work of architect H. J. Hardenbergh, who had created the old Waldorf-Astoria, the Plaza Hotel and the Dakota apartment house in New York City. With its graceful mansard roof, bull's-eye windows and Beaux-Arts embellishments, it drew rave reviews.

Luminaries like Mark Twain, Buffalo Bill Cody, John Philip Sousa, Victor Herbert, Maude Adams, Sarah Bernhardt, Flo Ziegfeld, Alice Roosevelt Longworth and a parade of foreign royalty were soon enlivening the public rooms. Mark Twain, master of the grand entrance, would descend the regal F Street staircase, decked out in white tie and tails, and proceed slowly down Peacock Alley to the dining room, escorted by a horde of twittering females.

In those years, many of Washington's enduring institutions were organized and held their meetings at the New Willard. The Men's Press Club, the University Club, the Alfalfa Club first saw light there. From 1905 to 1941 the Gridiron Club held its annual dinners there; U.S. Presidents came routinely. The Yale Club of Washington was founded in it, with President William Howard Taft its first president. The Republican National Committee had headquartered at the old hotel since Civil War days and continued at the New Willard, as did the Daughters of the American Revolution. Egypt set up its first embassy at the hotel in 1923.

Early in the 20th century, so the story goes, younger congressmen used to walk the mile from the Capitol to the Willard for exercise, making bets beforehand about who would be first to put his foot on the rail of the Round Robin bar.

A story is told of Calvin Coolidge, who spent his years as Vice President at the Willard. In 1922, a fire had broken out on the top floor following a Gridiron dinner and he, with other guests, was summoned to the lobby. After a while he started to leave, explaining to the fire chief, "I'm the Vice President." As he moved off, the chief stopped him. "What are you vice president of?" he asked. "The United States," Coolidge replied. "You come right back here," the chief said. "I thought you were vice president of the hotel."

In the 1920s, as the city moved north and west, even the New Willard began to feel the pinch of competition. The giant Wardman Park and then the Washington Hotel, next door to the Willard, opened in 1918.

Greek craftsmen re-created water-damaged decor in Crystal Room; chandelier prisms were hand-strung.

Then came the Mayflower, the Carlton and the Hay-Adams, across from the White House. Through the crowded years of World War II, the Willard continued to be prosperous, but by 1946 the Willard family was eager to sell out for $3,000,000. From there on it was downhill all the way.

In 1968, following the assassination of Martin Luther King jr., the Poor People's March and the general deteriorating condition of downtown Washington, the hotel closed its doors with only 40 guests in residence on that final day of July 15, 1968. Standing derelict for 15 years, with pigeons flying and weeds growing inside, under continuous threat of demolition, it is nothing less than a miracle that the Willard has been saved.

It was President John F. Kennedy who first commented on the shabby appearance of Pennsylvania Avenue and in time inspired the creation of the Pennsylvania Avenue Development Corporation (PADC), a federal agency charged with formulating and implementing a master plan for the avenue.

After first deciding to raze both the Willard and the Washington hotels and replace them with a large open square, the PADC was persuaded to reverse itself. A study sponsored by the National Trust for Historic Preservation and the National Park Service, and conducted by the Oliver T. Carr Company, had concluded that the site's best use involved redevelopment of the hotel. New York's Hardy, Holzman, Pfeiffer Associates came up with a stunning design solution, eventually realized under the direction of Washington architect Vlastimil Koubek.

At every step of the way, the planning, the negotiations—and the suits and countersuits—have been monitored by the Congress, the Department of the Interior, the Commission of Fine Arts, the Mayor's office, the National Capitol Planning Commission and organizations like Don't Tear It Down. Over the years, hundreds of letters from private citizens around the country poured in recalling weddings held there, honeymoons spent and dance cards filled there in years past.

Now that the Willard, as 82-year-old William Bradley Willard, grandson of its founder, says, "is grander than ever with everything but the spittoons restored," it remains to be seen how many patrons will enjoy the elegant rooms and suites at prices ranging from $160 to $235 for singles, $180 to $255 for doubles and $2,000 a night for the 2,500-square-foot antique-filled Presidential suite. So far, it has been a virtual sellout.

Calvin Coolidge would be aghast.

Peacock Alley, its name borrowed from the Waldorf-Astoria, fairly mandates strutting about in finery.

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Front view
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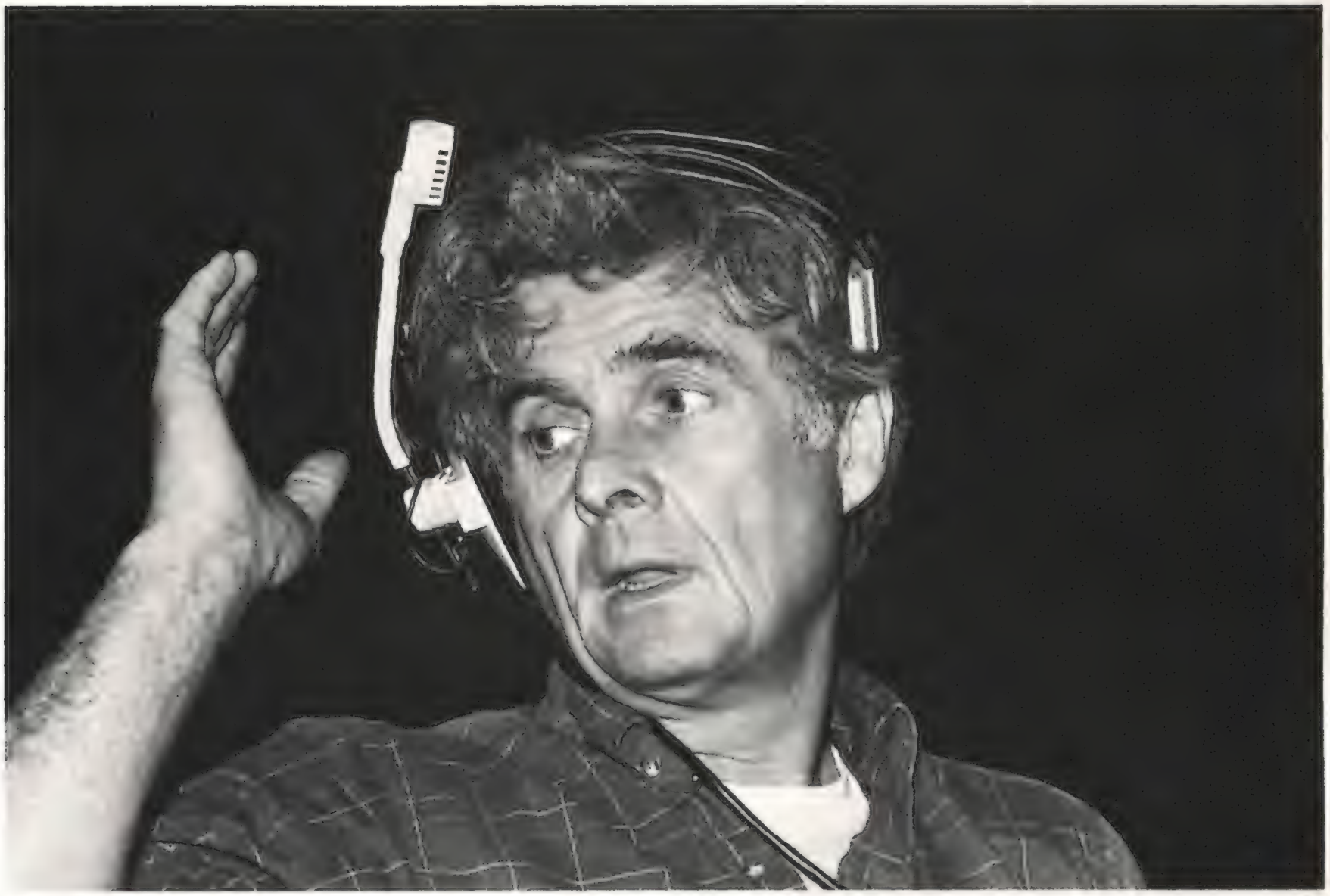

Opposite: During rehearsal of *Smile*'s first number, pageant hopefuls portray "typical" high school seniors.

Above: Hall oversees the action offstage, prompting some stagehands directly, cuing others over headset.

By Richard Conniff

The stage manager: Off-Broadway or on, the buck stops here

It takes computers and contraptions, but mostly an unflappable pro like Alan Hall, to prepare a modern musical for the theater

Eight weeks before the Broadway opening of his new musical, *Smile*, Marvin Hamlisch, the composer, stands begging shamelessly in the aisle of Baltimore's Morris Mechanic Theatre. What he is asking for is difficult. For the big finale, 15 chorus girls will line up inside a fragile, elongated cube called a mirror box, which will reflect them in glittering rows. Hamlisch thinks the girls will look even more glorious if they are standing on a tiered device called the pageant wagon. The trick is to get the wagon inside the box.

Alan Hall, the stage manager, is doubtful. The pageant wagon, which is 22 feet wide, rotates on a center-stage turntable, and the mirror box flies in from overhead. What Hamlisch wants Hall to do is a bit like spinning a huge pound cake on a lazy Susan and having the cake lid glide snugly down on top of it just as everything comes to a stop—without maiming the cake, the lid or the girls in sequined gowns walking in from either side. All this by remote control. And, of course, he must do it in time with the music and make it look easy. Elegant, even.

Isn't this what a stage manager's job is all about?

Photographs by Rhoda Baer

Writer-director Howard Ashman (left) checks time with Lawrence Gordon, one of play's three producers.

"Come on, Alan," Hamlisch pleads. "Make it work, break the machine, go for it. I ask you to do one thing in life." He hesitates. "OK, that and to set me up with a 19-year-old Jewish girl."

Hall acquiesces. He consults with Lizard, the stagehand who "flies" scenery in from above, and with Nasty, who winches scenery in and out at stage level, and then he talks them through the maneuver, deftly. The mirror box glides down and nothing breaks. Hamlisch and Howard Ashman, who is the play's author and director, stand back to consider the effect. What they see reflected in glory, alas, is the pageant wagon more than the people.

"Eighty-six," Ashman remarks. In other words, it doesn't work.

"Forget it," Hamlisch concurs.

"Clear it," Hall says unflappably into his head mike. "Fly the mirror." On the fly floor, a catwalk high above the stage, Lizard hauls up the mirror box and waits, with other stagehands sequestered around the theater, for further instructions from Hall.

This is of course exactly what a stage manager's job is all about when a new show is gearing up for Broadway. He is the middleman who takes the latest great idea from the creative side, figures out just how impractical it really is, coordinates a hundred or so people working in close quarters to make it happen onstage and then, more often than not, ushers it cheerfully to the Dumpster. What the stage manager does...

"Who *cares* what a stage manager does?" Abe Einhorn interjects. Einhorn is a veteran prop man on *Smile* and a conversational anarchist. "I never heard of a stage manager giving an autograph."

This is true. But except for signing autographs, there is almost nothing the stage manager doesn't do. Or rather, there is almost nothing connected with the running of a Broadway play for which the stage manager will not be blamed if it doesn't get done.

In the case of *Smile*, which is about a beauty pageant, Alan Hall must coordinate, cajole, dress up and sometimes dress down a cast of 34 people, a crew of 32 and an orchestra of 26 (though the musicians are mainly the conductor's headache). He must figure out how to run $500,000 worth of scenery, much of it stored overhead in a Dagwood sandwich of scrims, blackout drops, lights and hanging pieces, some of which weigh 2,000 pounds. He must oversee the operation of 28 computer-controlled winches, with as many as 14 of them running on a single scene change and as many as nine pieces in the air at once.

He decides when to dim the houselights and when to raise the curtain ("Light cue three . . . *Go!* Curtain . . . *Go!*"). And over the next two hours, he stands in a crowded corner at stage right with his head mike on, calling 292 light cues, 50-odd follow-spot cues, 120 flying cues, 52 winch cues, a cue to the conductor and three curtain cues—all of them requiring minute attention to the show and pinball-wizard timing. In tryouts, with scenes being restaged and songs being rewritten, he ends up calling a different show every night in front of an audience. And after doing this for a month in Baltimore, he must tear it apart, pack it up and move it to Broadway.

As for blame—pressure, really—he gets it even when everything goes right, even when he makes the scenery move as gracefully as the chorus girls. When the choreographer thinks a piece of scenery is outrunning the dancers across the stage, when the set designer wants a scrim flown out a half-scene earlier, when the head carpenter needs the stage to rebuild a balky set, and when the lighting designer threatens to kill the head carpenter if he doesn't give him time to adjust his lights, all of them line up to breathe down the stage manager's neck.

Sure, sure, Abe Einhorn concedes, the stage manager's important. Nobody moves without him. "He's leading the *Titanic* in among the icebergs."

Richard Conniff has written for SMITHSONIAN *about bloodhounds and entomologist Terry Erwin. His book* Irish Walls *was published last year.*

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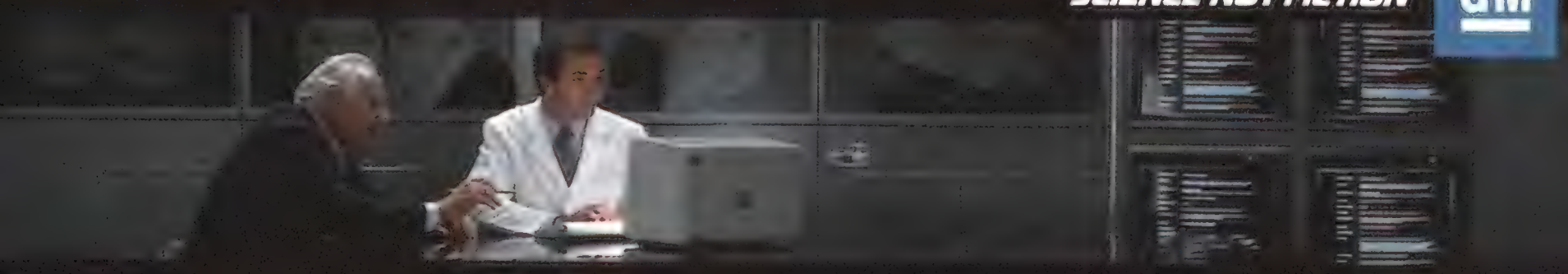

THE GM ODYSSEY:
SCIENCE NOT FICTION

GM

Carrying armful of artificial roses, prop master Abe Einhorn stops to chat backstage with an actress.

The theater world is hoping for something more like the *QE2*. Broadway has already had two disastrous new musicals in recent months, and it is counting on Hamlisch, the composer for both *A Chorus Line* and *They're Playing Our Song*, to save the season. Ashman's credits also look good; *Little Shop of Horrors*, which he wrote and directed, has just logged its 1,500th performance Off-Broadway. The question as the Baltimore tryouts begin is whether they can build a big musical on the kitschy phenomenon of the American beauty pageant, using material from a 1975 film satire, also called *Smile*, as their framework. A trio of producers is taking a $4 million gamble on the idea. The press is watching closely and television's *60 Minutes* is filming a segment on the new show's progress to Broadway.

In the normal course of things, little of this attention would land on Alan Hall, which suits him fine. But if stage managers generally get less credit for their work than they deserve, he says, it may be partly because they suffer from an outdated image. In the past, they were often failed actors, aging dancers, would-be directors. As Einhorn puts it, "Nobody ever grew up wanting to be a stage manager."

Hall actually grew up in a Yorkshire steel town wanting to be a civil engineer. Building and running stage sets was just an extracurricular interest. But when a college professor suggested he take time off to starve show business out of his blood, he went to work as resident stage manager at the Arts Theatre in Cambridge. In 1962 he came to New York with *Beyond the Fringe*, the university production that unleashed Alan Bennett, Dudley Moore, Peter Cook and Jonathan Miller on an unsuspecting world.

Hall fell instantly in love with big Broadway musicals, and happened to do so at an opportune time. Complicated sets were replacing painted backdrops. And instead of merely herding scenery on and off, stage managers were being asked to automate it, to start it and stop it on a musical beat, to make it move with the actors in complicated, choreographed patterns. "It gave the audience something else to look at," Hall says. "It wasn't just the actors anymore."

Hall caught on as stage manager for the national tour of *Hello, Dolly!* and traveled with the show for three years. Since then, he has overseen 18 Broadway productions that stayed afloat (including *Promises, Promises, Travesties, Sweeney Todd* and *The Real Thing*), along with seven that sank on opening night —an enviable record in show business. He has also stage-managed presentations for clients as diverse as General Motors of Canada and television's "Night of 100 Stars." At 51, he is considered one of the best at a job that splashy effects, sophisticated hardware and modern electronics have made increasingly important.

Hall himself is straightforward and unsplashy. "I'm a very *neat* person," he says. "My underwear drawer at home is always really neatly laid out and the socks are always folded." The theater is a somewhat larger problem. "I like organizing large bunches of people and large bunches of scenery, and I like packing lots of things into small places."

A tendency to collapse into mirth

He wears steel-rimmed glasses on a slightly beaked nose, with his eyebrows lifted inquiringly and with ramparts of steel-gray hair pushed up off his forehead. His face has a tendency to collapse into mirth, accompanied by tittering. But he is also capable of polite, deadpan impatience; the show runs on a discipline that is more often implied than stated outright.

In the middle of a Baltimore afternoon when he is working out mechanical kinks in the production, Hall sits on a cushioned board propped across the armrests of an orchestra seat, with television monitors, switch boxes and other gear arrayed on a table before him. Also a jar of pencils, and an open script in which he marks and endlessly edits his cues in careful block letters. The voices in his headphones buzz like mosquitoes, and people who don't have headphones con-

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Martha Swope

stantly drift by the table—if not to complain about some problem, then simply to chat. Hall takes an avuncular interest in all of them and in everything connected with the show. "It's just that I like to know what I'm doing," he reflects. Pause. "And I like to know what everybody else is doing, too."

There is a lot for one person to know. The crew is trimming down a platform that has so far prevented two dormitory towers from traveling onstage from either wing. Across 50 feet of theater, Hall and the head carpenter consult and gesticulate, inaudible except over headphones. Someone comes to Hall for petty cash, and someone else wants new batteries for crackling headphones that are making everybody jumpy. The first assistant stage manager, Ruth Rinklin, who is also Hall's wife, is urging the chorus girls into their gowns and out to a photographer taking publicity pictures in the lobby, one every five minutes. The man who works the spotlights wants to line up spot cue 31 on the character Big Bob Freelander, head judge of the show's pageant. "Be Big Bob for me, Betsy," Hall says to another assistant, who happens to be crossing the stage. Then the actor who plays Big Bob shows up and the follow-spot man lights him. "Foot outlines?" asks Betsy, standing next to Big Bob. Hall considers. "Yeah, foot outlines," he concludes.

A publicity man stops by to consult with Hall about some filming for *60 Minutes*. This, it seems, is one thing capable of riling Hall. "Three minutes of conversation with that producer," says Hall, "and I'm leaping in the air and screaming. He promises not to disturb the rehearsal, then sends a camera right down the line of chorus girls. He doesn't understand that the show comes first."

The show has the sort of scenic complexity Hall relishes, and his favorite sequence is the most complicated. It occurs in Act One and makes the transition from the first day of the pageant, when the girls have been learning their routines and sizing each other up, to day two, when they go before the judges. The sequence begins with the two dormitory towers onstage, Greek columns in front and a big window in back overlooking a painted sunny California community. Two boys sit at a table conniving to get Peeping Tom pictures of contestants in the Young American Miss pageant. Hall meanwhile is cuing the fly floor to get the light ladders (hanging racks which provide side lighting) and the Austrians (side curtains which conceal offstage business) up and out of the way for the coming flurry of action. A shower-room set piece has already descended from its storage position in the wings. The crew hooks it to the winch that will pull it onstage, and nine chorus girls crowd into three shower stalls.

As the boys finish their scene, Hall says, "Winch 140 will be on red, 150 on blue." He flips two switches on a cue box, which controls red, white, blue or green lights hanging in clusters next to Nasty at the winch computer and Lizard at the fly-floor computer. "Light cue 104 . . . *Go!*" Hall says, flipping off the cue-box switches to send Nasty and Lizard into action on their keyboards. The dormitory towers travel offstage, the Greek columns adjust to new positions and the occupied shower stalls and a set of sinks move onstage.

"Light cue 106," Hall says, on the musical beat. Sunrise burns through the background as the first group of girls step from the showers. The music takes two beats and then they are singing: "I woke up stiff, I

Hall watches as stagehands set up equipment and scenery before rehearsals for show's Baltimore tryout.

In complicated "shower" sequence, girls prepare for interviews while Hall's crews winch scenery in and out.

woke up sore,/ My back feels like it just came through the Third World War." *

Hall says, "Warning on winch 160 on blue." He calls two light cues, then sends the Austrians up again. "And here she is, your Junior Miss,/ I bet Anita Bryant never looked like this."

When the girls have all emerged from the showers, one of them sings, "What should I wear?" and the others reply, "A bag on your head!" Hall flips the blue switch and calls a light cue; the showers and sinks travel offstage and the crew promptly stores them for the night as the Austrians descend.

Upstage, behind the California backdrop, other crew members are preparing the pageant wagon with seats for the judges and for the contestants they will interview. As the girls nervously anticipate "the stupid questions that decide our fate," Hall is murmuring, "Warning on winch 170 on red, fly 40 on red, fly 41 on blue/white. Light cue 110 . . . *Go!*" Two more light cues and Hall flips the blue/white and red switches, causing the California community to fly skyward, the Greek columns to travel offstage, the stage right Austrian to go up and the pageant wagon to roll forward with four judges aboard. Girls dressed for their interviews enter and promptly take up the song of the exiting shower girls: "Someone tell the lions, here the Christians come!"

Two more quick light cues and Hall flies in a big, inquisitorial hanging lamp over the interviewee's head. The first contestant sits down, the music comes to an abrupt halt, and at the same instant the overhead light glares down on the girl and a follow spot picks up a judge firing off his question. The whole sequence has taken two-and-a-half minutes.

Hall and his crew are technological wizards but sometimes their resourcefulness is taxed to the limit. One night near the end of the Baltimore run, somebody accidentally erases the computer program that controls almost every light in the show. The electricians begin frantically retyping data to run the 400 circuits the lights normally require, and Hall considers this choice: go on with only spotlights, compromising the value of this particular tryout, or wait for the electricians. But among the bits of everybody's business in Alan Hall's head is the knowledge that all the important lighting is on the first 260 circuits. At 8:30, with the electricians at 200 circuits and still typing, the stage manager raises the curtain; the show goes on.

"A snap," says Abe Einhorn. He waves a prop, a bouquet of artificial roses, in Hall's direction. "He don't do nothing over there."

Three weeks before the Broadway opening of *Smile*, Alan Hall's traveling desk sits on a New York City sidewalk outside the Lunt-Fontanne Theatre. It is a sort of 19th-century clerk's desk on wheels, painted a battered green and equipped for any eventuality. It contains, among other things, Kleenex, a measuring tape, a flashlight, two stopwatches, safety pins and a small pharmacy stocked with everything from instant ice packs (for battered gams) to Alka-Seltzer and Emetrol.

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Because he is responsible for coordinating all aspects of the production, Hall stays in close contact with everybody. Here he pauses near lighting equipment to confer with a consultant about the light dimmers.

Actress shows Hall costume from a scene that was cut during rehearsal of the show in Baltimore. A study in grace under pressure, Hall asks questions, encourages comments and creates a calm atmosphere backstage.

Under the slanted writing surface are some props that have been "eighty-sixed," including a spoon with cottage cheese made of foam.

There has been a great deal of eighty-sixing lately, despite a successful Baltimore run; the mirror box itself has been thrown out in the process of refining the play. And now Alan Hall's desk is out, too, on practical rather than esthetic grounds: it simply doesn't fit in the cramped backstage of the Lunt-Fontanne.

But neither does much else. Nasty (known to his mother and Alan Hall as Chris Nass) has moved with his winches to the basement, which Hall describes as "Chris' little engine room." The chief electrician has taken his computer to electrical heaven, a dusty cul-de-sac between the orchestra ceiling and the roof. A stage ramp has forced the conductor out of the pit, and a carpenter is now digging a hole for him among the first-row seats. And Hall has been relegated to a narrow closet, stage right, where he can see the show (and cue it) only with the help of television monitors.

Hall wanders nonchalantly through all the chaos of loading-in—the smell of the sawdust, the roar of the circular saws, the electrical cable coiled in heaps like spaghetti. Now and then he suggests a better way to fit lots of things into small places, and everywhere he picks up odd and possibly useful information about what everybody else is doing. He makes it look like schmoozing, but things seem to happen in his wake.

Hall talks shop with Marvin Hamlisch during a break in rehearsal. Notebook on the desk is a "prompt copy" of show's script, which Hall marks up with all scenery and lighting cues. Switches by his cup control cue lights.

At Baltimore dress rehearsal, Hall uses prompt copy to "call the show" from a cramped room backstage. He announces all cues into head mike while following action onstage and in orchestra pit on monitors.

Or maybe it would be better to say things *don't* happen. Regularly and almost unnoticeably, Hall averts disaster. When the carpenter thinks he has the conductor's new position right and wants to push ahead, it is Hall who gently insists that the conductor try out the sight lines for himself, and it is Hall who collars the conductor and brings him over from a rehearsal studio two blocks away. When the choreographer is out for the day and the director turns to the assistant choreographer for an important change, it is Hall who points out, through the assistant director (a subtle touch), that this might be impolitic.

Hall has a rationale for his low-key style: "When people get uptight, they become afraid to make interesting decisions. Usually the better shows come out of a more relaxed, healthier atmosphere." One way he gets this atmosphere is by grabbing blame, even when nobody's looking for a scapegoat.

"Did you notice anything special about Maria's crossover tonight?" he asks, after a show in Baltimore.

"She got a laugh," Howard Ashman replies. Pause. "You didn't want her to get a laugh?"

"Did you notice there wasn't a spot on her? I completely forgot it."

Ashman shrugs. "So tomorrow night you'll light her and she won't get a laugh."

Hall thus sets the mood for the entire production. His stagehands are devoted to him, knowing he will

protect them—as long as they don't make the same mistake twice. And the creators of the show find his reasonableness contagious. All of them defer to his organizational common sense. He seems to know not merely where everything should be put, but whether it needs to be put there right now or a week from Thursday. As a rehearsal is about to begin one afternoon in New York, Ashman actually inquires, "Do I have time to go to the bathroom?"

"Yes," Hall says, and then he notes, "I've never given a director permission to go to the bathroom before."

Ashman plainly trusts and depends on Hall, having never done a musical on Broadway. At times, he even echoes some of Hall's curious locutions: "Alan, could you fly me the scrim in for a look-see, please?" He defers to Hall on all practical matters partly, at least, because Hall never attempts to involve himself in artistic questions. It is Ashman's show, not his.

Keeping the original vision intact

For Ashman, a stage manager who wanted to be a director would be a disaster not merely in getting the show to opening night, but afterward. When the show is up and running, somebody has to keep the original vision intact. Hall is known to be scrupulous about this, about giving the audience the same show the authors created and the critics reviewed. When the director and the producers have gone on to other things, Hall will be preparing understudies and casting substitutes. At his desk (his new desk, that is—a scaled-down plywood affair the carpenters have knocked together), he will draw lines on the television screen to check that pieces of scenery arrive at their proper positions night after night. In cleanup rehearsals, he will excise the little improvements the cast members are prone to make. Ashman trusts his stage manager because he knows he'll always recognize his own show.

But enough of harmony and good feeling. It is time for Abe Einhorn. Hall runs into him one afternoon as Einhorn is pushing a dress rack down a back corridor of the theater. "If Moses had a stage manager," the prop man begins, "the Israelites would've been in the desert for 120 years instead of 40. If Columbus had a stage manager, he would've wound up in China."

And in truth, the production is still in disorder, still recovering from the move, with only a few days till the first New York preview. During a technical rehearsal, the follow spots drift off, walleyed. The dormitory towers bump. Hanging pieces come lurching in from overhead like drunken puppets. All the horrid nightmares of the stage manager's job parade themselves onstage. There is talk of dumping the first preview. Everybody needs more time—except the business manager, who notes that on this particular day, Veterans Day, the holiday pay scale is costing the producers more than a thousand dollars every hour. He lines up with the other people breathing down Alan Hall's neck and inquires if it would be possible to have everybody out of the theater by 9 P.M. As it is already 9:30, Hall promises to shoot for 11.

The fly floor, which hasn't had time to get its cues onto the computer, is scrambling to keep up and there is chaos on stage right. An assistant stage manager looks to her stage-left counterpart and laments, "They're reading *War and Peace* over there and *we're* having a bloodbath." Ashman is on edge: "I'm trying real hard not to blow."

Hall calls winch cue 230. There is a loud thud and, over the singing of the full chorus line, the sound of shouting from backstage. Ashman walks up to Hall with his head down and his fists in his pockets. "No matter what time it is, no matter how much trouble you're in," he says, "you can't have people shouting backstage when there are actors working."

Hall nods. Very calmly, with an ineffable sense of when to bear down and when to ease back, he tells the crew, "Try, if you can, not to shout backstage. I know it's hard, but we're doing valuable work out here."

The work and the calmness pay off, if only in organizational terms. They finish for the night at 11, and the first New York preview comes off on schedule a few nights later. The refining and the restaging continue. (Even Einhorn has been working on his lines; he now says that if Columbus had a stage manager, "all three ships would've gone off the edge.") For the first week, Hall is still calling a new show for every audience. And then suddenly it is opening night: klieg lights, limousines, a black-tie and gold-lamé crowd studded with big names. "Warning on the houselights," says Hall, "warning on the conductor, warning on the curtain."

The evening goes off flawlessly. The scenery moves with a fluid unobtrusiveness; the show dances. The audience gives it a standing ovation and Hall lets the cast take four curtain calls. The critics, it turns out, are not nearly so kind. The show may still sell tickets, no matter what the savants say; advertising may even turn it into a hit. Or it may fold any week. But at that moment, months and years of work seem to have come to glorious fruition.

Afterward, amid the hosannas and congratulations backstage, Alan Hall notices that something is missing from a prop piano. "Someone's been stealing the black keys from the piano," he declares, in mock horror. He will have to check on that tomorrow.

After curtain descends on opening-night performance in New York, a wrung-out Hall awaits the reviews.

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Fractal image by IBM physicist Dr. Richard Voss.

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By Bob Reiss

Merv Larson's team takes nature to the animals

With fiberglass, 'shotcrete,' paint and elbow grease, they build zoo habitats that please their occupants and instruct human visitors

Deep in the Asian rain forest, a leopard treads the length of a fallen log, searching for prey. Nearby, a gray-and-black tapir trots to a riverbank to drink, while 20 feet above, a gibbon careens between leafy branches. The hot, steamy air is alive with the screams of birds and insects. A waterfall plunges over the edge of a limestone cliff into a pool below. Silently, a crocodile surfaces.

Suddenly three teenagers appear, keeping to a man-made walkway skirting a large banyan tree and a long rock wall. The path takes the visitors beneath a huge fallen trunk. Looking up, the girl's eyes widen and she jerks her hand to her mouth. "Python!" she yells.

But there's no danger, not at the Bronx Zoo's recently completed $9.5 million Jungle World. The python is behind glass and so is the leopard. It's difficult for visitors walking along this path to remember that this cacophonous forest sits in the midst of our country's largest city. But this forest isn't what it seems. The realistic-looking trees are fashioned from epoxy and fiberglass. The rocks are concrete. Even many of the twisting vines are artificial. (The water, it must be admitted, is real.) This fantastic environment was built by the highly specialized Larson Company, which has its headquarters in Tucson.

Feeling right at home, gavials lounge in grotto built at Bronx Zoo's Jungle World by the Larson Company.

For ten years, Merv Larson and his five-dozen employees have built naturalistic homes for animals—rock pools for hippos in Baltimore, ledges for pygmy chimps at the San Diego Zoo, and numerous waterfront lounging areas for walrus, penguins, sea lions and puffins. Shivering under arc lights at 2 in the morning, garbed in wet suits and working at low tide in the Pacific, they've pumped hundreds of yards of concrete, to form a boulder tidal pool for the $40 million aquarium in Monterey (SMITHSONIAN, June 1985). They've built lava tubes in Albuquerque, puffin nests in New York, a coral reef bed in Florida and a rocky grotto for a wealthy Arab in France.

One of Larson's exciting current projects, now in its early stages, is at the Smithsonian. His company is part of a team chosen to design a re-creation of an Amazonian river and forest for the National Zoo. Larson's contribution to the project, which is planned to open sometime in 1989, will include overall design and layout of the rock formations, especially riverbanks and cliff faces. The new jungle environment will incorporate the concrete structure that presently occupies the site (an old polar bear exhibit). It will be a challenge, says Larson, to find ways to get people to feel they are actually "in" the jungle rather than on the outside looking in. This can be done by putting small winding paths through the area, and by taking the people along underground paths and letting them peek through openings into the jungle or cutaway sections of streams and ponds.

Dumping the old tile-and-bar cage

"Sometimes," says Larson, "I'm amazed at what we can do." His clients feel the same way. "There's no other work of comparable quality in the world," says William Conway, director of the New York Zoological Society, which operates the Bronx Zoo. At Chicago's Shedd Aquarium, curator of exhibits Paul Bluestone adds, "If you wanted a violin made and Stradivarius were still alive, you'd use him, right? We use Larson."

For several decades, zoos and aquariums throughout the United States have been turning to the handful of companies like Larson's to change the old tile-and-bar zoo cage into a more pleasant and natural living space for animals. "Technology is reaching higher levels. There's an increasing public demand for natural environments," says Brian Rutledge, the director of the Baltimore Zoo.

Ironically, curators say phony trees and rocks often look more real than the real thing might look in the same setting. Trees in a jungle go up 50 feet before branches start, says Conway. Jungle World doesn't have the room, and real trees might rot. Real rock formations might weigh thousands of tons, Larson says.

Photographs by Terrence Moore

John Challis, manager for Central Park Zoo project, stands at the site where polar bears will cavort.

How could you transport such massive structures to a zoo? Break them into pieces and reassemble them? They would look fake.

Beyond the comfort of the animals and the enjoyment of the visitors, zoo officials cite another important reason for creating exhibits that provide a semblance of animals' habitats: environmental conservation. Increasingly aware of dire danger to wild lands and animals, they hope exhibits like Larson's will spur visitors' involvement in efforts to save the real thing. "Tropical forests cover six percent of the Earth's land but support 50 percent of all plant and animal species," says Bill Conway. "They're being cut or burned at the rate of 50 acres a minute." Writing in *Curator* magazine, he posed the question "How can you expect to excite or educate people by exhibiting the animal in a concrete bathroom that provides him so little space and variety he can do no more than men do in bathrooms?"

Two thousand miles from the man-made rain forest of The Bronx, Merv Larson leans back in his swivel chair on a 90-degree Tucson afternoon. His office is rife with activity: the company is in full production of trees, costing up to $25,000 apiece, to be shipped to New York's Central Park Zoo.

Headquarters is a two-story warehouse in an industrial park. It looks out on the brown, hazy Santa Catalina Mountains in the distance and a fleet of purple refuse trucks parked in rows beyond a fence. Not exactly the spot you'd think jungle trees came from.

The interior walls of the boxlike building are decorated with colorful photographs of completed Larson projects. A diver swims amid tropical fish: the coral reef bed is the company's work at Sea World in Orlando, Florida. Peer closer at imposing sandstone cliffs in another picture and you notice a tyrannosaur emerging from the upper right-hand corner: employees worked as consultants and oversaw construction of the rockwork for the Calgary Zoo's Prehistoric Park in Canada.

"I was always interested in building—and in animals," says Larson, a wide-shouldered, bearish man in a loose-fitting cotton shirt. He puts his feet up on the desk. At 56, he's got the kind of deep sunburn you associate with an outdoor worker. There's dirt under his fingernails. He earned a B.S. degree in zoology from the University of the Pacific and an M.S. in herpetology from the University of California, Berkeley. For 13 years, he was curator of the Sonora Desert Museum near Tucson; then, for five years, he served as director. He speaks with the deep, soft tones of a late-night talk-show host.

"As a boy in California I collected animals and built dioramas," he says. "*Life* magazine and Walt Disney got me started building bigger environments. Back in the early 1950s I was at the Sonora Museum when I saw an old *Life* with an artist's conception of the desert, day and night. A cutaway drawing. You could see animals above and below ground. In 1953 we built the first habitat at the museum, a cutaway burrow. It pressed up against the glass. Visitors could see the animals even when they went underground. I'm sure

At polar bear exhibit, workers spray four-inch-thick shotcrete layer over structural-mesh "rock" form.

Free-lance writer Bob Reiss, whose most recent novel is Divine Assassin, *wrote about Australia's "Tea & Sugar" train in the June* SMITHSONIAN.

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Using a filed-down dental tool, a technician sculpts wet concrete in the joint where two cast rocks meet.

Bottles strapped to Ken Tywoniw's body contain colors he sprays onto "rock" to simulate surface of granite.

the tactile sense of being secluded gave the animals a feeling of security."

Visiting Disneyland's artificial Tom Sawyer Island a short time later, Larson wondered if the same technology could be used in a zoo. In 1956 he and other Sonora Museum staff members built the early tour de force, an entire walk-through tunnel at the museum, complete with animal burrows, stalactite caverns and dank underground passageways echoing the eerie sound of water dripping into pools. For another exhibit, portraying a Shasta ground sloth (which has been extinct for 11,000 years), realistic dung was recreated. As their model for the dung, workers studied some actual prehistoric excrement that had been found in a cave in southern Arizona; it had remained intact in the hot, dry desert climate. Analysis showed that it was composed mostly of dried Mormon tea, a shrub which still grows in the Southwest.

Today, although the company offers everything from mangrove, banyan, palm and other trees to life-size fiberglass models of porpoises, whales and sharks, rocks remain Larson's main love. "Rocks have soul," he says. "Most people figure rocks are inanimate, but they're moving. They're being eroded, built up. They won't last forever."

A home surrounded by rock and cactus

Larson has plenty of opportunity to study rock, even at home. Each evening he drives his late-model blue Chevy pickup through blasted-out two-lane passes in the Tucson Mountains to the Arizona desert, where he lives with his wife, Peg, on a 40-acre property. The mountains he looks out on when the sun goes down are real rock and real cactus. He constructed the grotto swimming pool off the patio of their home. Man-made lava and granitic formations provide the contour of their walled-in garden.

Back in New York, the techniques he pioneered in rockwork are being put into practice. At the Central Park Zoo, the company's roving project supervisor, John Challis, picks his way through the construction site, past stacks of two-by-fours and piles of steel rods. He's on his way to check progress on the sea lion and aviary exhibits. Over his shoulder in the background looms the skyline of luxury hotels on Central Park South. He's a mustached 38-year-old in a white hard hat, flannel shirt and goose-down vest. It's raining and chilly in Central Park. As the zoo's famous Delacorte Clock chimes 11, Challis ducks under a circus-tent-size tarp covering the sea lion exhibit.

A gray, dusty, subterranean pallor coats a hard-hatted worker carving still-wet rocky ledges, putting on finishing touches. A four-foot-high kerosene heater belches flame at the top, sputtering. It is here to keep

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Working from a design sketch, Larson employee welds "branches" to metal superstructure of larger limb.

At Larson studio in Tucson, Jonquil LeMaster-Rock saws urethane-foam "limb" of tree into final shape.

the rock warmer; freezing breaks down new concrete. The whole scene resembles an archaeological dig more than a construction project. It feels as though any minute a worker might hold up a fossil or old vase and yell, "I found it!" That's how real the rock looks.

We're eight feet down in a soon-to-be underwater cavern. Sea lions will swim here as visitors stroll around the pool, but for now the animals have been shipped away. The continuous granitic formation rises 15 feet. Calving dens at the top will have heated floors. Real cobblestones will be brought in to form the beach. In hidden hollows in the rock, zoo horticulturists will plant vegetation. Later they'll dab on mold or lichens with nontoxic, nondissolvable acrylic paint.

In the aviary, the rock-building process is just beginning. Referring to clay and papier-mâché models (done on a scale of a half-inch to a foot) kept nearby in the company's trailer, workers dig 16-inch-wide trenches in the earth. The trenches are then filled with concrete. Malleable steel rods two or three feet long will be inserted in the wet concrete. Because the "rock" in this case will be granite, the rods are bent and twisted to broadly define its characteristic planes. Next, thick wire mesh is shaped over the rods. The whole project begins to resemble a half-collapsed chicken coop (without chickens). Now the rock "surface" can be sprayed on.

Wearing masks so as not to inhale flying dust, workers with hoses begin pumping concrete called "shotcrete" over the framework. The shotcrete adheres to the rod and mesh. Rock begins to form along the defined lines. After it dries, a layer of dyed cement plas-

ter is spread over the shotcrete; it is then sculpted.

"If we're making sedimentary rock, you'll see more striation," Challis says. "We get it by bending the rods, like steps. For granite, which we're making here, the rods stay straighter."

In another kind of rock-making, which has been in existence for decades, latex molds are made from actual rocks and then concrete is poured into the molds. Making casts in this manner is far more expensive than the steel-rod-and-mesh method, but it produces a far more accurate surface, which is sometimes necessary. Larson workers use the casting method, for example, when they want to reproduce rock types that have detailed surfaces, such as lava or limestone; or when a portion of rock will be positioned in an exhibit in such a way that visitors can look at it very closely.

As Challis' crew builds bases for the aviary's jungle trees, Jonquil LeMaster-Rock, 34, sculpts branches back in Tucson. "She's made the first truly realistic artificial trees in the world," says Bill Conway, who supervised artificial tree-making at the Bronx Zoo in the 1970s. LeMaster-Rock is energetic and direct, black-haired, with blue-green eyes that turn up at the edges. Wearing a white-paper suit and orange gloves, she's working on a stepladder. Right arm draped over a tree limb, she smears on gobs of clay-color epoxy and smooths it out with a trowel.

Scattered around the concrete floor amid tools and spigoted oil drums filled with epoxy, the branches, mounted on wooden platforms, resemble swamp trees in a horror movie—ash white, naked. They are designed to be inserted into sockets in the main trunk. Prefab trees.

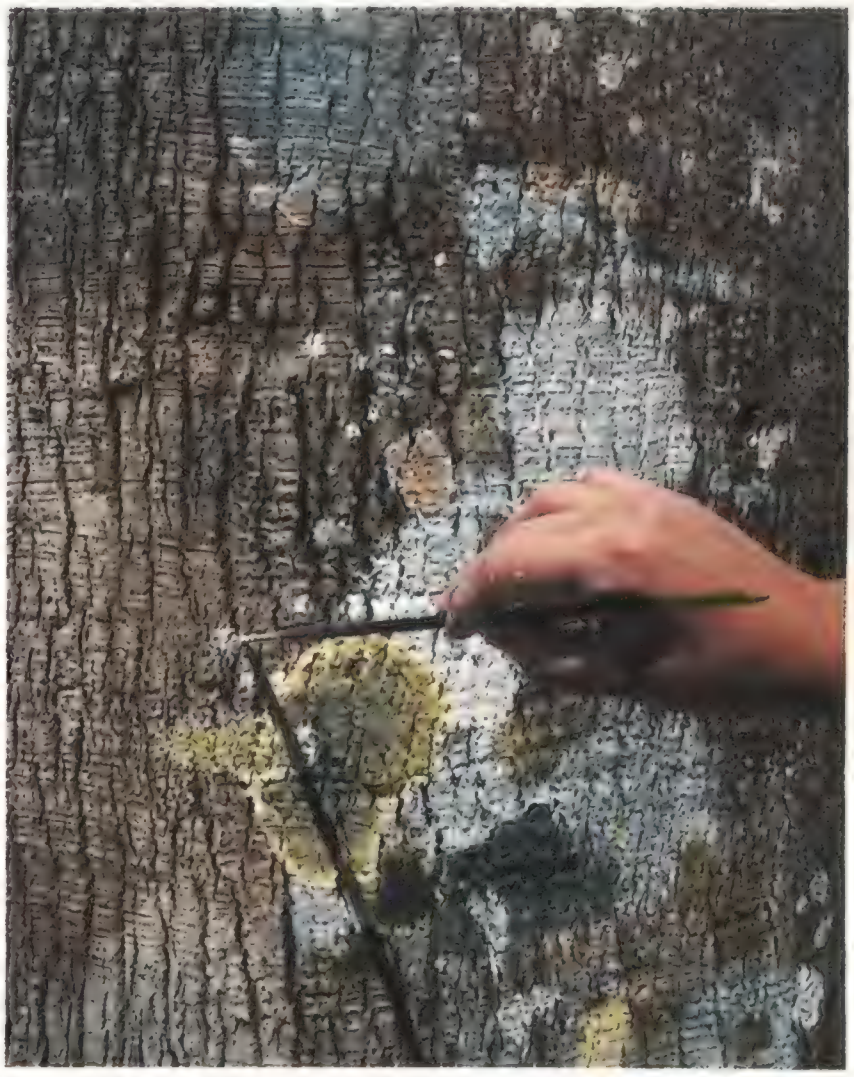
Fiberglass coating is applied to recumbent tree trunk; limbs have been fitted into sockets of the tree at left.

"I said I could do anything"

"I was working with a commercial exhibit firm in Portland, Oregon, after graduating from college, when I met Merv," says LeMaster-Rock. "He was doing rockwork. I was fascinated. I volunteered to help. I wanted to work for him. Later he called to say he had a job in New York building trees. Could I do it? I said I could do anything." Neither LeMaster-Rock nor Larson had built trees at that point, but Conway was willing to give them a chance.

"We went to Florida and looked at mangrove swamps in the Keys," she says. "We took photos and went back to the zoo and started working. Two-and-a-half months later we had a tree, but no one liked it. It was lumpy. I went back to Florida. I blew up photos. I was obsessed with trees. I'd stare at them. I started to draw them all the time. I dreamt about them. My husband and I went camping and collected branches with the same kind of forking we needed, or heaviness.

"Sometime between the first and the second tree, it



To simulate lichen growth, a water-based paint is brushed onto the final "bark" surface of the tree trunk.

Company founder Merv Larson, here at his home near Tucson, explores the Arizona desert in his free time.

all fell into place," she says, and she got busy building them, naming the early creations as their personalities took shape. "The 'Princess' was a gray tree near the gibbon area, very feminine, small and sensuous. The roots of the 'Exit Strangler,' a ficus that was placed near the end of the exhibit, dropped down to the walkway and looked ominous."

LeMaster-Rock applied the same kind of inventiveness to more unorthodox creations. For an elliptically shaped ant nest at Jungle World, she sculpted clay into the hollow of a hard hat to create a mold. Then, for the outer surface, she cast sections of rubber that were combined to form the nest. To create a termite nest, which looks like a fantastically shaped sandcastle complete with turrets and spires, she carved sheets of foam in the castle shape, covered it with fiberglass, and finally added a layer of epoxy, which she sculpted.

Want to build a gigantic jungle tree for your home, garden or proboscis monkey exhibit? Like a good cook, Larson won't reveal the whole recipe. Work is done in two sections—trunk and branches; and while he will not discuss the fabrication of the trunk, he will describe how the trunk's surface is finished, and how branches are made and attached.

After the trunk is made, its layered-fiberglass skin is coated with epoxy for hardness, textured with a secret process and painted. "Lichens" are dabbed on with paint. A branch starts differently—as a long steel pipe bent into the desired shape with the help of a blowtorch. One end is embedded in square fiberglass tubing, which will later be inserted into a socket in the trunk. An already-cast epoxy "tip" is stuck on the other end. The remaining exposed pipe is sprayed with a quick-drying, expandable urethane foam. The hardened foam is then carved into branchlike form, first with a saw, then with a knife. After being covered with epoxy, it is textured and finished. Leaves on the trees are usually genuine: they come from real plants in hidden pockets in the trees, or from real vines growing around the artificial trunks.

"The huge banyan tree along the Jungle World walkway was the most difficult tree to make because the shapes of the aerial roots are complex and represent years of growth," says LeMaster-Rock. "I loved sculpting all those roots."

A glance into the parking lot outside reveals tree trunks in various stages of completion. Lying on its side on a makeshift wooden platform, a newly made tree of sea-green fiberglass waits to be sandblasted. This tropical tree is wide at the bottom and tapered toward the top. A passerby asks, "What's that, a missile?" Another tree hangs suspended between two poles, waiting for LeMaster-Rock to apply the first layers of fiberglass.

Nearby, a finished tree—broken down into trunk and branches—lies under a tarp, waiting to be shipped. In the final or "gorilla" test, before this tree was taken apart for shipment, staff member Andy Anderson (opposite) swung from its branches to check their strength (this is not Anderson's only responsibility at the Larson Company).

Downstairs, David Rock, Jonquil's husband, makes puffin nests for the Central Park Zoo by gluing plastic pipes together. "The pipes will be buried in rock so viewers will see only the openings," he says. In the same workshop, Anderson, a quiet 37-year-old with a mustache, jeans and a pencil behind his ear, fabricates palm trees for a hotel chain.

All of these Larson employees love the challenge of creating something so that it looks natural. Like their boss, they find satisfaction in the thought that their efforts may promote conservation. And, always, they get a kick out of the unexpected results of their jobs.

Anderson, for example, built fiberglass whales for the Santa Barbara Museum of Natural History before joining Larson. His work looked so realistic that on the day the whales were flown to the aquarium an irate citizen called the police, complaining that someone was mistreating whales, flying around with them suspended from a helicopter. This is the kind of realism the company aims for, if not exactly the kind of citizen involvement they hope to provoke.

Andy Anderson conducts "gorilla test" on tree destined to support tropical birds in Central Park Zoo aviary.

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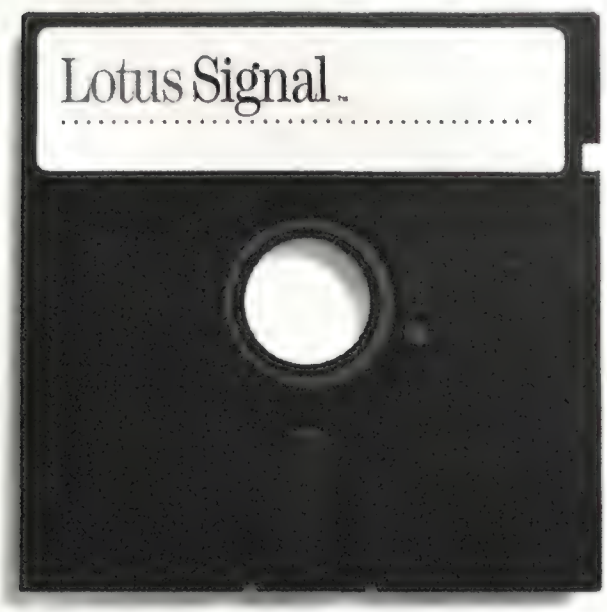

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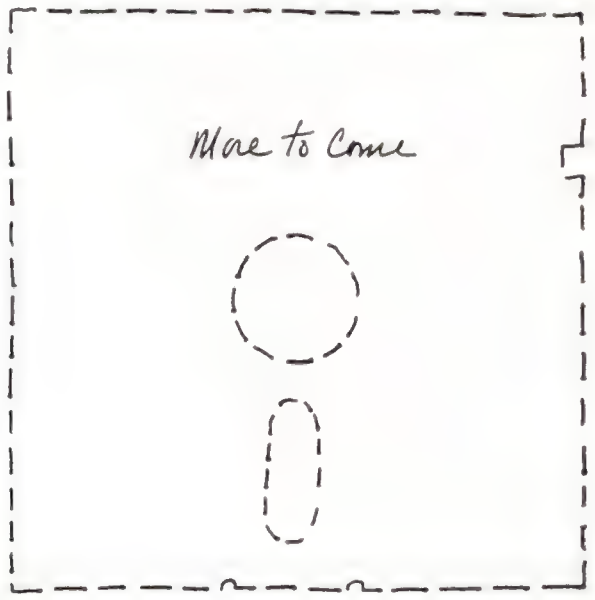

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His classic eye catches light from the laser

King Dexter, who photographed the High Sierra in the Ansel Adams tradition, turns his camera on lightscapes of a new technology

The laser photographs seen here and on the next pages were made in a studio that scarcely resembles the laboratories where lasers are usually used. It might be more easily mistaken for a 19th-century photographer's workshop. King Dexter, before he began making these images, spent two decades making semiabstract studies of nature inspired by Ansel Adams' classic landscapes, and worked with Adams for several years.

Dexter's switch from hoofing it through the High Sierra photographing junipers, clouds, granite and rushing water, to working with lasers in a small, dark room for months at a time, was something he had not planned or anticipated. A student of his, who also happened to be a physicist, simply offered him a laser to experiment with. Dexter first thought it was a joke. "I envisioned a deadly, James Bond-type weapon being delivered to my home on a flatbed truck," he recalls. Assured that the laser was not dangerous and was small enough to carry under his arm, he accepted.

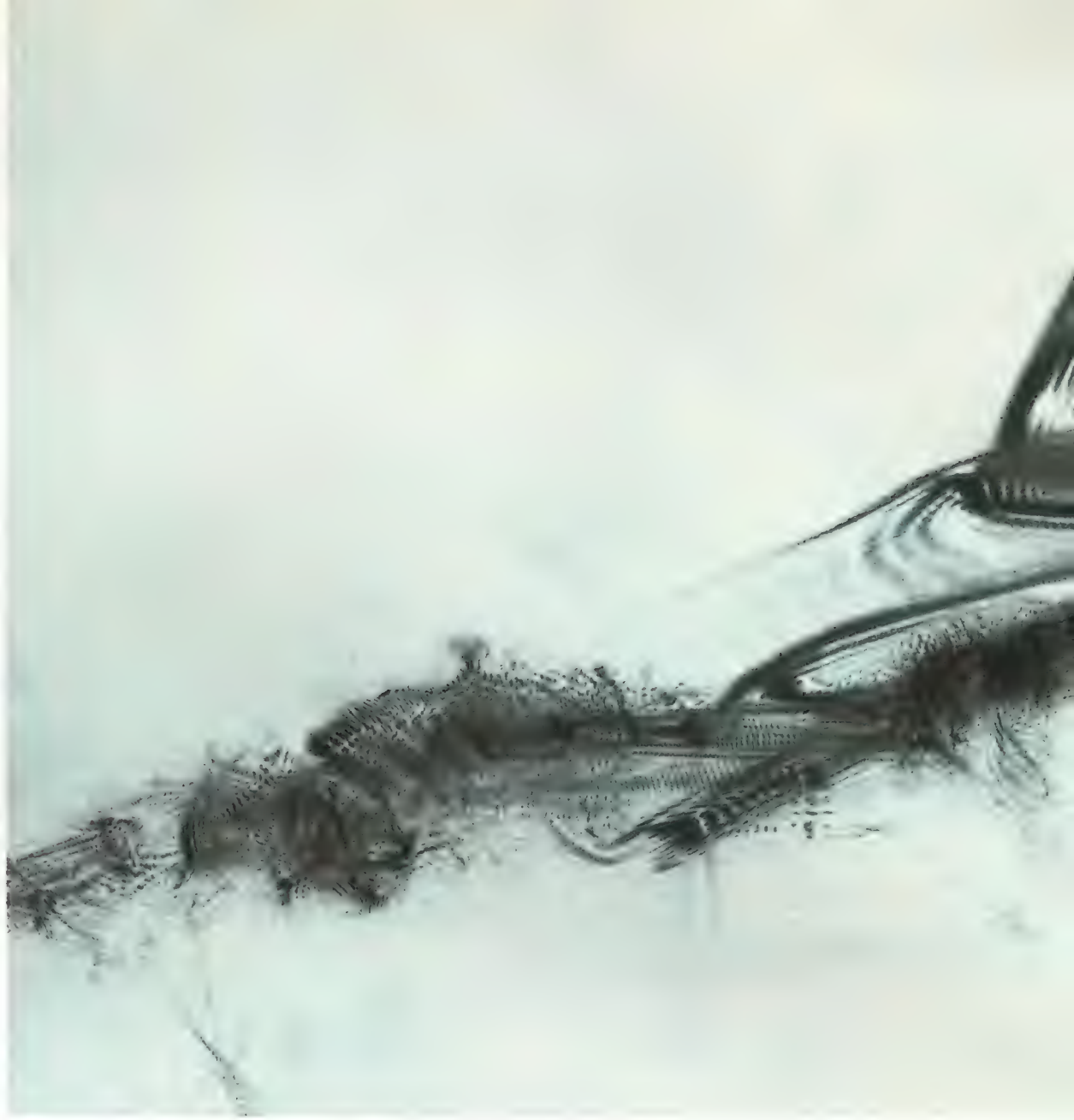
Dexter spent several months seeing what the laser would do when beamed onto and through all kinds of objects, from perfect crystals to bits of broken and melted glass. The technique he worked out involves interrupting the beam with something that refracts it into abstract patterns, which Dexter then records on eight-by-ten-inch transparency film or other photosensitive material. In this work, Dexter found the laser a source of visual expression comparable to his jaunts in the Sierra, but he admits to missing the fresh air and exhilaration that comes with sunlight.

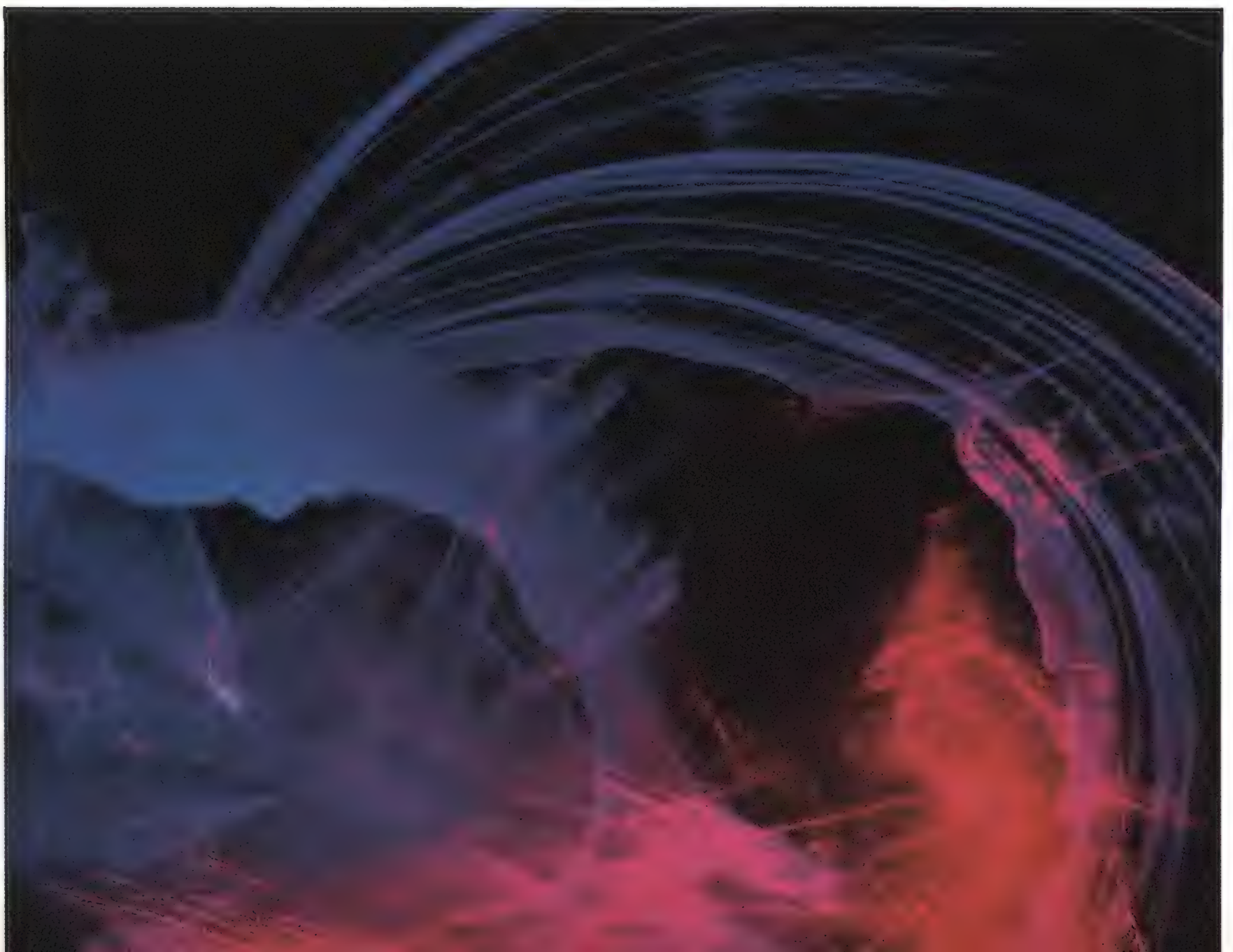
Alan Ross

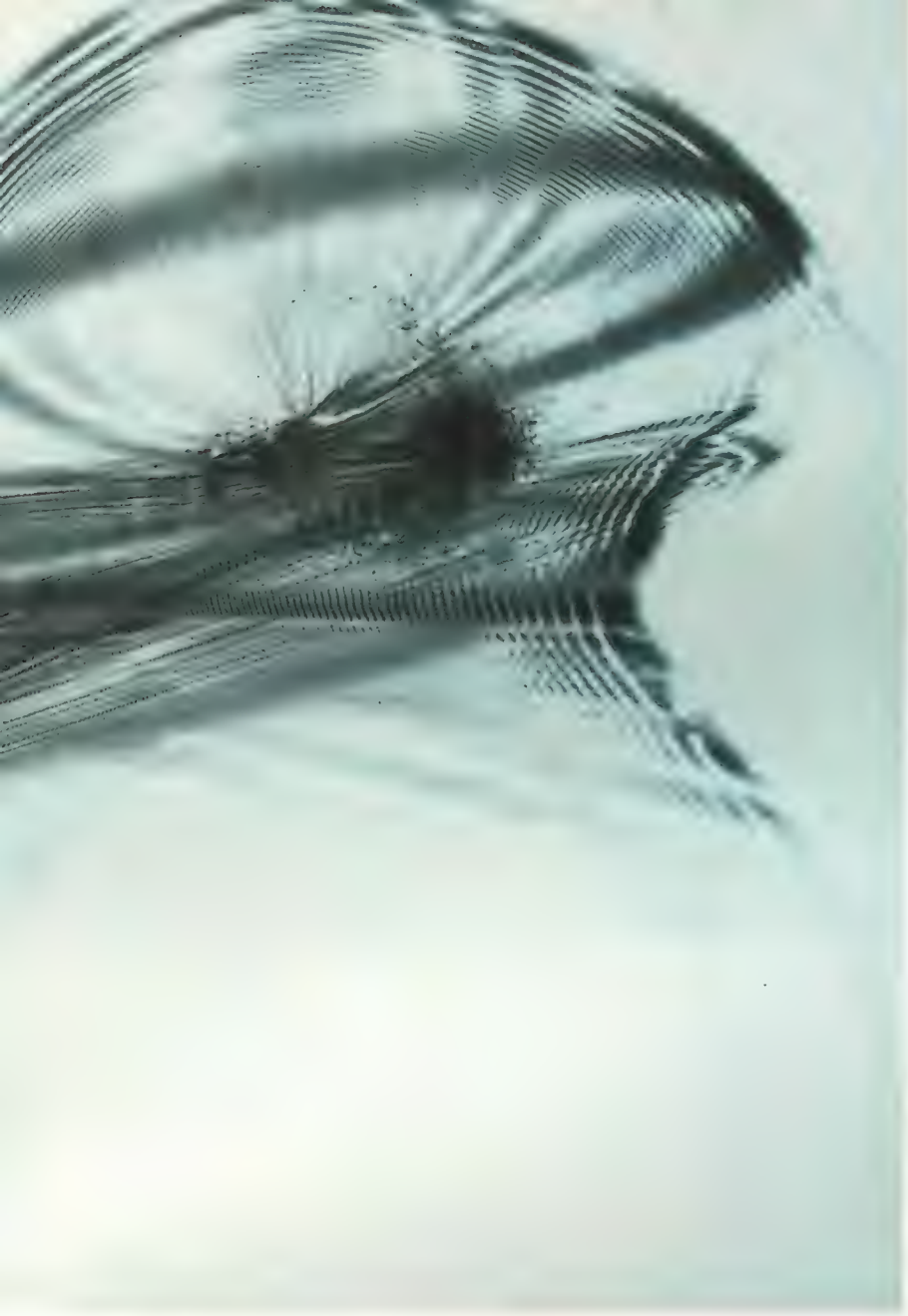
In Dexter's otherwise modern darkroom, laser setup has old-time look; beam passes through jar onto film.

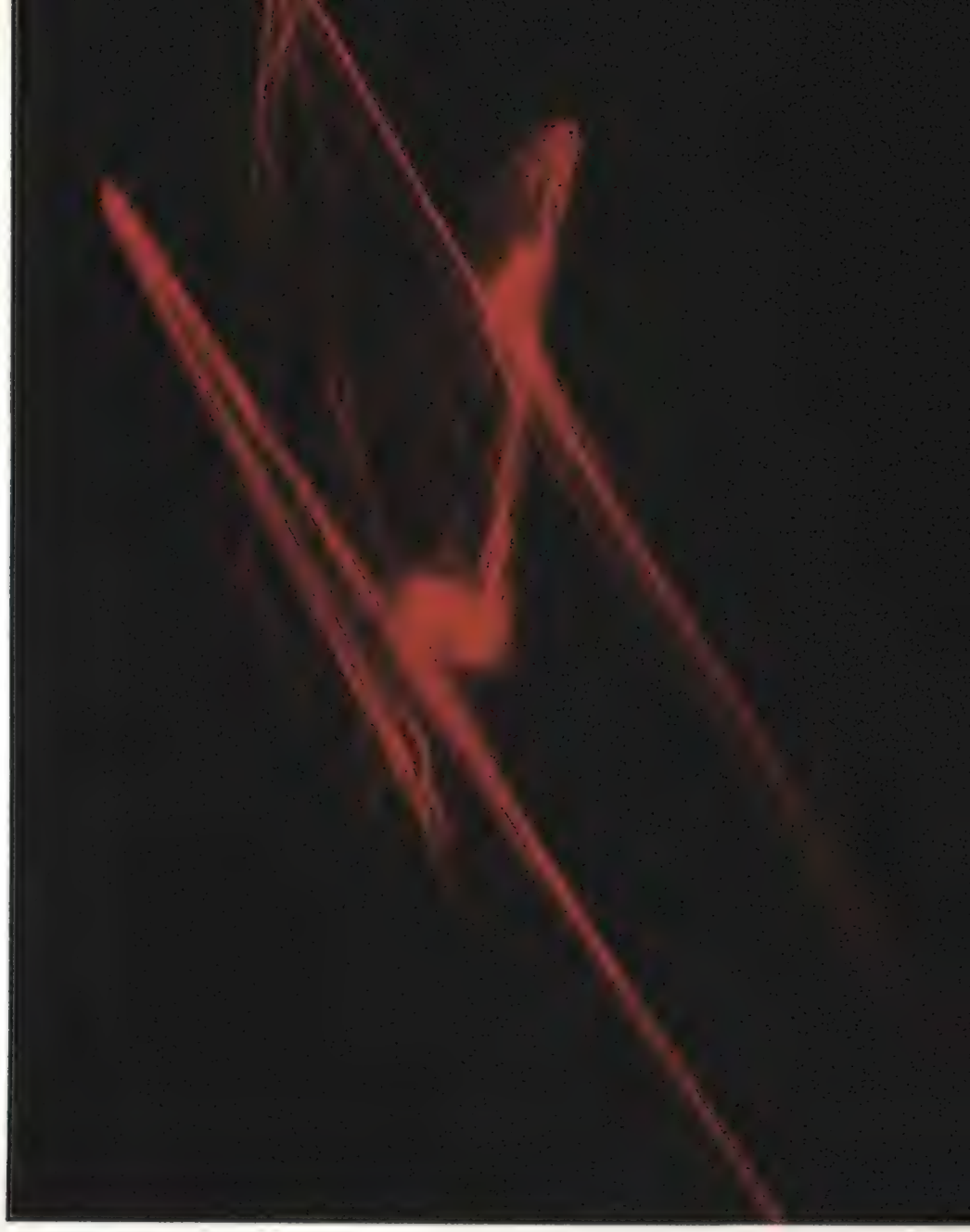
Refracting beam through bottom of whiskey bottle and onto color film made bright image (opposite). Raised letters on mason jar created the one above, printed in color from a black-and-white transparency.

The helium-neon laser used to make these pictures produces primarily red and bluish hues, which Dexter varies with exposure and color filters. At right, beam was refracted through jar onto black-and-white negative, then color print was made through a filter. Image at far right came from diagonal pattern on a crystal pitcher. An antique milk bottle was used with blue filter to get picture at bottom left, and floral design on a glass ashtray refracted laser into bottom-right image.









FRIDA

By Paul Hoffman

Triskaidekaphobia can strike when you're most expecting it

Especially in elevators, or on Fridays, or if the wrong number of guests turn up for dinner

The dark forces have triumphed again. They have made the 13th of the month fall on a Friday—and not only in February, but in March and November, too. Those who suffer from morbid fear of the number 13 will want to go into hiding, because in any given year the maximum number of Fridays falling on the 13th that the sinister forces can serve up is three. There is at least one Friday the 13th in every year, but the faint of heart will be spared another triple dose of calendrical evil until 1998.

As everyone knows, even in this seemingly rational age the number 13 is often avoided in the labeling of high-rise floors and hospital rooms. Latent (and not-so-latent) superstition undoubtedly contributed to the appeal of the gory cult film *Friday the 13th*, a summer-camp-dismemberment extravaganza in which fun-loving youngsters are slaughtered at Camp Crystal Lake, where a mongoloid child once drowned. Fear of the number 13 can be applied to space technology. At least when the 13th Apollo mission, launched at 1313 hours Central Time from pad 39 (the third multiple of 13), had to be aborted on the 13th of April 1970, the wicked number was implicated by the newspapers.

Triskaidekaphobes, the original Greek for those suffering from the morbid fear of the number 13, can muster ample historical evidence in support of their affliction. After all, Jesus was 13th at table and look what happened to Him. The belief that 13 people cannot dine together at the same table without fatal consequences actually goes back even farther than the Last Supper. Some popular accounts have it that in Norse mythology, the demonic god Loki crashed a dinner party of benevolent deities, making their number 13 and thus causing the death of Balder, the god of light.

The fear of dining 13 at a table has plagued personalities as various as Napoleon, J. Paul Getty, Herbert Hoover and Franklin Delano Roosevelt. In Paris a *quatorzième*, or professional 14th guest, can be hired on short notice to round out an otherwise ill-fated dinner party, but FDR simply drafted secretary Grace Tully. In her memoirs, Tully writes: "The Boss was superstitious, particularly about the number thirteen." She was often called upon at the last moment to fill in at lunch or dinner because a late addition or default brought the White House guest list to 13. Tully also recalls how Roosevelt "went to great pains" to avoid departing by

Triskaidekaphobes like to offer evidence to explain their affliction.

Illustrations by Lane Yerkes

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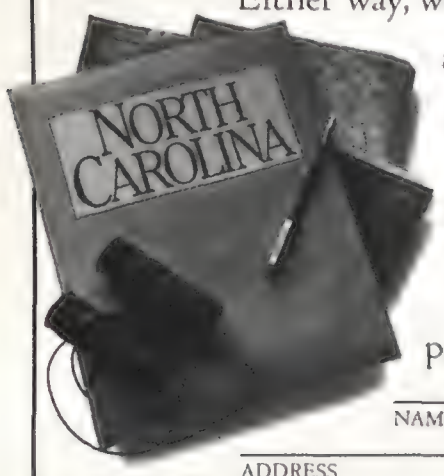

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Registering birth of Princess Margaret was put off for days to avoid number 13.

train on the 13th of the month, even if that "meant pulling a train out at 11:50 P.M. on the twelfth or 12:10 A.M. on the fourteenth."

The idea that numbers are not mere instruments of enumeration but are sacred, perfect, friendly, lucky or evil goes back to antiquity. In the sixth century B.C., Pythagoras, whom schoolboys associate with the famous theorem that in a right triangle the square of the hypotenuse always equals the sum of the squares of its sides, also made a religion out of numbers. In numerology, the number 12 has always represented completeness, as in the 12 months of the year, the 12 signs of the zodiac, the 12 hours of the day, the 12 gods of Olympus, the 12 labors of Hercules, the 12 tribes of Israel, the 12 Apostles of Jesus, the 12 days of Christmas and so on. Since 13 exceeds 12 by only one, the number lies just beyond completeness and, hence, is restless to the point of being evil.

Friday the 13th is doubly potent because it draws not only on the evil power of the number 13 but on Friday's reputation as a day of bad luck. Since Christ was crucified on a Friday, the day can be seen as a time for endings, not beginnings. It has even been claimed through guilt by association that Eve gave Adam the apple on a Friday. Friday is no day for getting married, embarking on a journey, moving into a new house, start-

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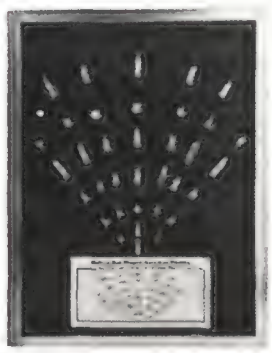

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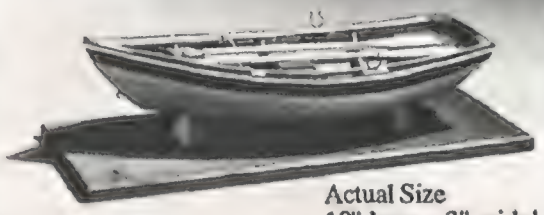
On Friday the 13th, January 1882, 13 stouthearted men in New York City had had enough of this foolishness. Although the sky was reportedly black and murky, and the "wind wailed through the leafless trees with



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a mournful sound, which, to the superstitious mind, suggested the Banshee's cry," these 13 intrepid founders of the Thirteen Club dined in room 13 of Knickerbocker Cottage at 454 Sixth Avenue from 13 minutes past 8 until the 13th hour. They offered toasts to the health of Trismegistus, "an ancient Egyptian" who they said was the 13th son of a 13th mother (though they did not explain how that could be). Having set the club's initiation fee at $1.13, monthly dues at 13 cents and a life membership at $13, the members pledged to continue dining together 13 at a table on the 13th of every month.

As they freely spilled salt at these sumptuous feasts and cheerfully took postprandial walks under ladders, it was their custom to tell each other stories about the number 13. One concerned an elderly Englishman who, fearing the consequences of 13 at a table, always insisted on dining

Thirteen Club members boldly debunked all sorts of other superstitions as well.

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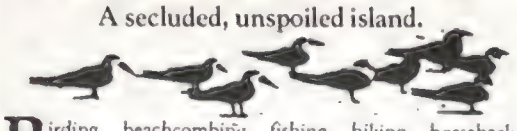

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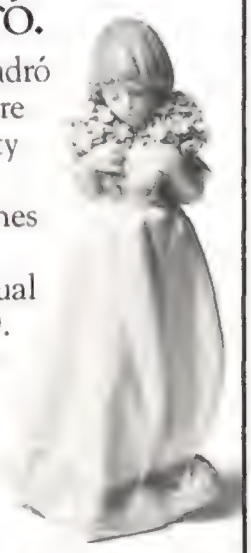

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It has even been claimed that Eve gave Adam the apple on a Friday.

alone; he persisted in this for years, until one day he died. Thereupon his followers concluded that on the whole it was safer not to dine at all.

Club membership swelled to 1,300, including the likes of President Chester Arthur and P. T. Barnum. Branch clubs, which paid a charter fee of $13.13, sprang up in London and in cities across the United States. By writing to judges and legislators, New York's Thirteen Club partly succeeded in freeing Friday from the slur of being Hangman's Day. In the 1890s, Decius S. Wade, Chief Justice of Montana (who fortunately belonged to the club), described how he had sentenced a murderer to be hanged on a Thursday: "I could not see but the fellow enjoyed it just as well as though Friday had been the day appointed, and I thought poor, abused

Loki, Norse God of fire, courted disaster by joining 12 others at table.

Friday looked a little brighter the next morning."

Not to be outdone by the home club in New York, the London branch carried its 13th-of-the-month dinners to funereal extremes. Club salt shakers were shaped like coffins and the dim lights like skulls. For badges each member wore a small coffin in his buttonhole from which a tiny skeleton dangled. Cross-eyed waiters made sure the knives and forks were crossed

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and mirrors were freely broken. So notorious was the club in challenging the dark forces that a neighborhood undertaker, believing that some of its members would be struck dead, sent over his black-edged business card.

What is more, a few of the club's own members, overcome by sheer fright, failed to show up. Writing in *Confessions of a Caricaturist*, Harry Furniss, the cartoonist for *Punch* magazine who presided over the London club's dinner on January 13, 1894, shared a letter from an absent member: "At the last moment my courage fails me, and I return the dinner ticket you have so kindly sent me. If I had only myself to think of, I would gladly come and defy the fates . . . . But I have others to think of—dogs and cats and horses—who if anything happened to me would be alone in the world. For their sakes I must not run the risks that a faithful carrying out of your programme implies. Trusting that nothing very terrible will happen to any of you in after life. . . ."

To counter *triskaidekaphobia* further, the various Thirteen Clubs collected and promoted "lucky" stories about the number 13. This practice, however, was frowned upon by the clubs' more skeptical members who feared that they were not undoing a superstition but simply reversing it.

One of the New York club's finest moments came in 1886 when it persuaded María Christina, Queen Regent of Spain, to ignore the pleas of her ministers and christen her son "Alfonso XIII." (Alfonso later became so unpopular that he had to abdicate the throne.) But his mother's rational act did not mark the end of royal superstition. On August 21, 1930, when Queen Elizabeth's sister, Princess Margaret, was born in Scotland's Glamis Castle, palace officials did not immediately record the birth because the next registration

Paul Hoffman, an essayist who writes frequently on science, tries his best to walk under ladders.

number was 13; they waited three days for another birth so that they could assign Margaret the harmless number 14. And in 1965, when Elizabeth herself was touring Germany, she was scheduled to depart by train from platform 13 in Duisburg railroad station. Nervous officials hastily changed the platform number to 12 A.

If queens and Presidents go out of their way to avoid the number 13, it's no wonder that the common man does, too. A Columbia University study of 403 psychology students found that 40 of them, or ten percent, thought it was unlucky to have anything to do with the number 13—and who knows how many more may have believed this but were embarrassed to admit it. Professional skeptics, like magician James Randi, have hardly made an effort to counter *triskaidekaphobia*, concentrating their efforts instead on exposing as flimflam such things as levitation and the bending of spoons by mental telepathy. They may think that by comparison, fear of the number 13 is innocuous—and perhaps it is. Yet as recently as 1978 it was estimated that *triskaidekaphobia* costs America a billion dollars a year in absenteeism, train and plane cancellations and reduced commerce on the 13th of the month.

I, for one, am hardly impressed by the historical evidence in favor of 13's wickedness. After all, for every sinister association of 13—say, the 13 witches in a coven—I can cite a good association: for example, the 13 Colonies that formed the original Union. I am, however, distressed by the mathematical evidence. If you were the diabolical number 13, you'd want to wreak havoc on the human race as often as possible. Therefore, you'd want the 13th of the month to fall on a Friday more often than it falls on any other day. And that, in fact, turns out to be the case. If you don't believe me, consult the elegant paper, "To Prove That the 13th Day of the Month Is More Likely To Be a Friday Than Any Other Day of the Week," in *The Mathematical Gazette* (Volume 53, 1969, pages 127-29). It was written by an Eton schoolboy, S. R. Baxter, at the age of 13.

Perhaps with witches (13 to the coven) and 13's wickedness in mind,
Etonian S. R. Baxter, at 13, proved Friday is more likely to fall on the 13th.

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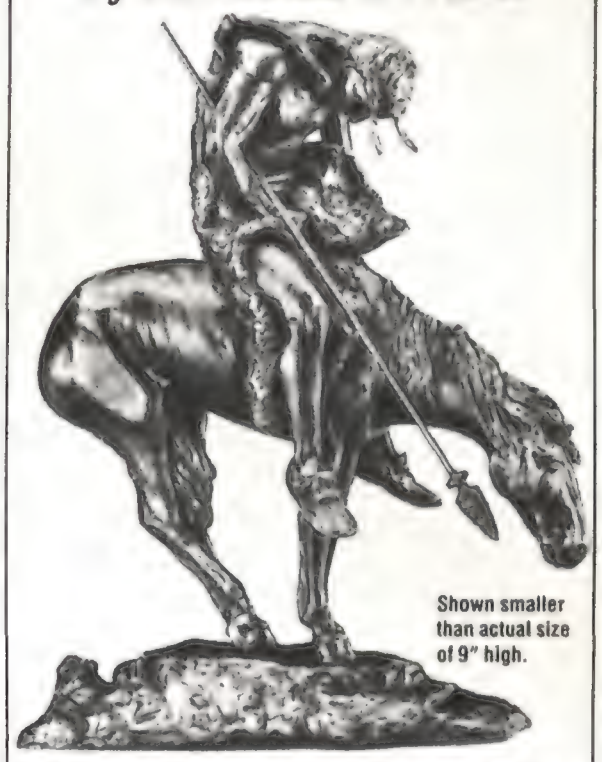

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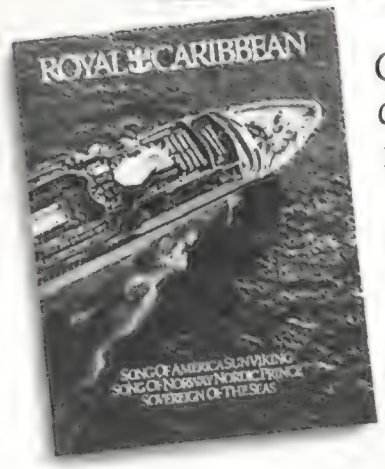

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Book reviews

The Frampton Flora
Richard Mabey
Prentice Hall, $25

It is a rare artist who can portray one flower as though it mattered to eternity. Leonardo da Vinci and Albrecht Dürer each possessed the gift. (See Leonardo's drawing of the star-of-Bethlehem, and Dürer's delicate flower paintings.) As this book reveals, so too did eight or more ladies from the Clifford family of Gloucestershire in Great Britain.

Any who may be skeptical at this point are in good company. It seems the author of the book, naturalist Richard Mabey, none too fond of trendy nostalgia, declined when the publishers first asked him to write the text. He declined, that is, until he saw the flowers.

Victoria was Queen during many of the years when the Frampton paintings were done (1828-51). English notables

The homely sweet pea "has a keel that was meant to seek all shores."

like F.W. Smith and Thomas Nuttall were then producing botanical illustrations of acclaimed grandeur. The illustrations, mostly color engravings, signaled the era as a golden age of floral art. For all their esthetic force and scientific preciseness, though, the famous illustrators often missed something the Cliffords caught as they combed the remote Frampton parish countryside.

Frampton was and is a hamlet on the southwest fringe of Gloucestershire. The Clifford family's settlement there predated Victoria's monarchy by eight centuries. Through good times and bad, the family stayed and grew, managing the Frampton estate and farming acreage surrounding the village. The Victorian Clifford ladies, by engaging in floral art, were simply following prevailing politesse. Like other women of their social station, they sketched from life on clan outings or on private jaunts throughout the parish, then painted later at home.

The Clifford drawings and paintings are intuitive rather than analytical; fully sensed, not studied. This is their distinction. While botanically accurate, they are also beautifully clear and fresh.

Mabey's book manages to redouble these qualities, thanks to an artful play between author and book designer. In today's driven trade-publishing field, it is by no means an axiom that book design will be fine-tuned to art content. When time and care are taken so that trade book becomes art object, congratulations are due.

How did they manage it? For one thing, author Mabey's introduction is the book's only extended narrative. Once enlightened thoroughly yet economically—with the equivalent of a few deft brushstrokes—on the history of the flowers, the reader is free to savor the collection.

Many of the plant names are lyric: traveller's joy, runaway Jack, ploughman's spikenard, mouse-ear hawkweed, pellitory-of-the-wall, among others. Passages rich in plant fact and folklore are patterned like stepping-stones among the artworks. There are old family recipes for hyssop cough medicine and poppy "Surfeit Water" (wine). A passage on the ubiquitous sweet pea, not solely quaint, concludes the book: "In 1900, a country parson gave an address on the bicentenary of the arrival of the sweet pea in this country [England], that would have endeared him to an earlier generation of Cliffords . . . : 'Gentlemen, the sweet pea has a keel that was meant to seek all shores. It has wings that were meant to fly across all continents. It has a standard which is friendly to all nations. It has a fragrance like the universal gospel.'"

The range of blossoms reflects Frampton's diverse terrain. There are garden flowers and wildflowers from meadow, marsh, forest, byways and estate grounds. Handling would indicate that the artists had their favorites. Orchids and snowdrops—interestingly, contrasts of opulence and simplicity—are outstanding.

One disclosure from the introduction lingers as the pages turn. These works narrowly missed permanent obscurity. It was by sheer chance, in 1982, that a Clifford descendant discovered them in a fusty attic of Frampton Court.

For the botanist, then, *The Frampton Flora* provides archaic detail on flowers, and bits of biography of past floral artists—always scarce and sought after by that profession.

For the rest of us, eternity is a bit gentled.

Barbara Hall
New York book reviewer

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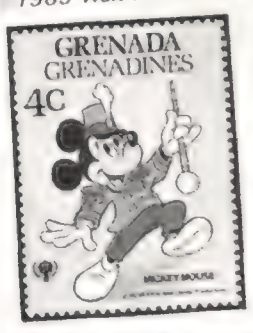

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Going Solo
Roald Dahl
Farrar, Strauss & Giroux, $14.95

The first half of this short, enchanting memoir reads like a travelogue by a writer far more gifted than the usual scribbler of "travel news." In 1938, 22-year-old Roald Dahl leaves London for Tanganyika on "an old paint-peeling tub of 9,000 tons with a single tall funnel and a vibrating engine that rattled the tea-cups in their saucers." Aboard the vessel were motley folk of "that peculiar Empire-building breed of Englishman who spends his life working in distant corners of British territory. Please do not forget that in the 1930s the British Empire was still very much the British Empire, and the men and women who kept it going were a race of people that most of you have never encountered and now you never will. . . .

"It would seem that when the British live for years in a foul and sweaty climate among foreign people they maintain their sanity by allowing themselves to go slightly dotty." Dahl's shipmates include a couple who jog naked at dawn and a gent named U.N. Savory who conceals his billiard-ball baldness with wigs of gradually increasing length as well as fake dandruff.

Dahl describes his encounters with hilarity and droll gusto, as he does his adventures on reaching Dar es Salaam and becoming a representative for Shell. He learns Swahili, helps rescue the wife of his host's cook from a lion carrying her away for an evening snack, sees black and green mambas in deadly conflict, notes that elephant hides "hung loose over their bodies like suits they had inherited from larger ancestors, with trousers ridiculously baggy" and strolls through a herd of giraffes who "incline their heads very slightly and stare down at me with languorous demure expressions."

Such reportage might become unduly languorous but for adroit excerpts from letters home warning of war on the way. When war does come, the theme of *Going Solo* changes swiftly as Dahl drives 600 miles north to Nairobi, enlists in the RAF and learns to fly in an open-cockpit Tiger Moth. But his tone of voice remains "what a lucky fellow I am. . . . Nobody has ever had such a lovely time as this."

Commissioned a Pilot Officer, he is sent off in another archaic biplane, a Gloster Gladiator, to join 80 Squadron in the Libyan desert, but cracks up and

is so badly hurt he is hospitalized for five months, then has four weeks of convalescence. By then, 80 Squadron is in Greece desperately trying to protect the evacuation of the British Army. Dahl is given two days to learn to fly a Hurricane, then buzzes across the Mediterranean and into combat the next morning. The squadron has only 15 planes, while the onrushing Luftwaffe has 1,000. But Pilot Officer Dahl battles a sequence of JU 88s, ME 109s and ME 110s with wide-eyed nonchalance, much as if he were E.T. going out on Halloween to pot pumpkins with a BB gun. He sees a solitary goat "wandering on the bare rock. 'Hello, goat,' I said aloud into my oxygen mask. 'I'll bet you don't know the Germans are going to have you for supper before you're very much older.'

"To which, I realised as soon as I'd said it, the goat might well have answered, 'And the same to you, my boy. You're no better off than I am.'"

Dahl's account of those grim days, in which most of his mates were killed, is alternately funny and poignant as well as aptly illustrated with his own snapshots. He survived Greece and more fighting in Palestine and Syria, downing four German planes and one Italian before being invalided home in 1941. Throughout, his story is blithe and understated—a fine vignette of war's horrors and Man's bravery. *Going Solo* is Roald Dahl's 25th book. Readers will be impatient for number 26.

James Parton
Author of *"Air Force Spoken Here": General Ira Eaker and the Command of the Air*

The Gothic Choirstalls of Spain
Dorothy and Henry Kraus
Routledge & Kegan Paul, $59.95

You can tell St. Peter by his keys, the ones that open Heaven's gates. Or Moses by the tiny horns, a sign of fierce wisdom, that poke out from under his shaggy, Charlton Hestonish locks. Or that the world is going to hell in a handbasket because a quartet of plump chickens is roasting a predatory fox.

All such things are abundantly clear in the hidden world of choirstall art, intricate wood sculpture—much of it dating from late medieval times—that covers cathedral and chapel stalls. Certainly there were plenty of places for such rich decoration: seat back, handrests, underseat misericord, even the overhead canopy referred to as a dust guard or dust protector (*guardapolvo*).

This is transitional art, striding from medieval impulses toward the exuberance of the Renaissance. So, though the ultimate message of this art is tied to church doctrine—"People, be good"—there are secular notions and scenes that fill out the picture. In Toledo Cathedral, for example, there are views of the reconquest of Granada. But elsewhere, two boys playing a kind of hockey properly hold paddles in one hand—and daggers in the other—surely a comment on the violence often associated with the game. Some carvings even comment on human lasciviousness.

In fact, games seem unusually well represented in choirstall carvings. Commentators have frequently noted how crazed *we* are over sport and play. To judge from these scenes, which after all were displayed on the church chancel, so was medieval society.

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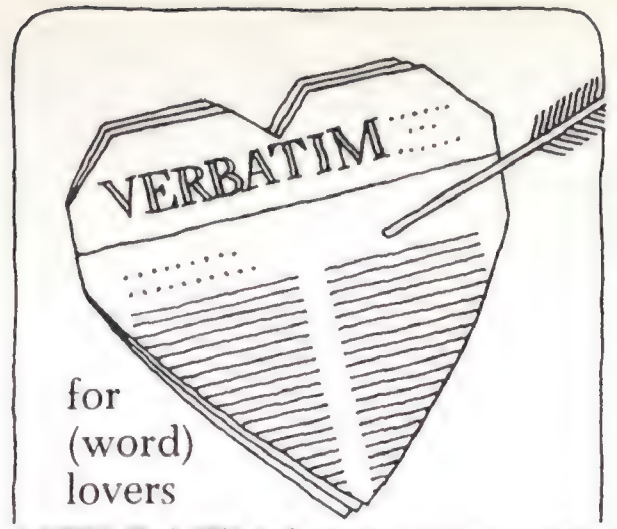

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Medieval ideas suffuse the thought and expression of every later age. Indeed, revisionist history has succeeded in finding epiphanies—intimations of Renaissance—in virtually every century from the fall of Rome to Christopher Columbus and beyond.

The other remarkable thing about the period is that it has so much vitality that it creates adherents, people who dub themselves medievalists and who go on to devote a lifetime to discovering messages in medieval bottles.

Just such a pair is the husband and wife team of Dorothy and Henry Kraus, who specialize in medieval art. Recently they've published on the twin poles of that art: the economics of building the great cathedrals, and, on the smaller scale, working on those small wooden sculptures under choirstall seats called misericords (SMITHSONIAN, April 1976).

This time out, the Krauses have taken their sleuthing and their experienced eyes to medieval Spain and produced a book that's a catalog of the nation's choirstall art (they looked at nearly 5,000 carvings). But it's also the record of their heroic efforts to find, preserve and reinstall a long-neglected set that disappeared from the nave of Oviedo Cathedral in 1902.

Essentially, this set of 80 choirstall seats fell victim to tragically obtuse changes in ecclesiastical taste. The late 19th-century bishop Ramón Martínez Vigil had seen the clearings of the great cathedrals in France. Without a choirstall and screen before the chancel, there's much more room for the devout and the line of sight to the altar is left uncluttered.

Centuries of medieval art were swept away in these clearings—and in the subsequent "restorations" that allowed 19th-century designers their own interpretation of what the Middle Ages should have looked like. In fact, at times the mania for destruction became so bad that medieval stained glass was actually removed from some great lancet windows to admit more light.

Clearly, the choirstalls of Oviedo Cathedral had to go. Balkanized into two groups, they first went to two smaller chapels within the cathedral complex. The next depredation occurred in the Spanish Civil War of the 1930s. During

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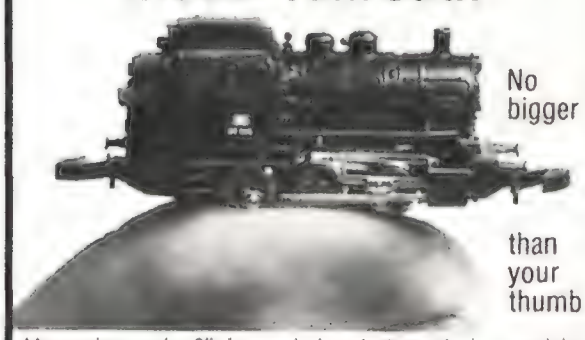

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those trying times, some of the stalls were set aflame by lunatic incendiaries; later, a military counteroffensive saw the cathedral shelled and one of its chapels badly damaged, its dome collapsed.

So much for the fragile wooden choir-stalls. Relegated to forgotten attics and cloisters for years, they were prey to dry rot and termites. What remained appeared to be merely a jumble of soft and decaying wood, wood that had once held some of the finest art of the 14th and 15th centuries.

Such was their condition when the Krauses were shown them in 1976. Within just a few years, thanks to an international consortium of foundations, restoration of the remaining stalls was under way. The Krauses, without intending it, had been accepted as supervisors for the task. Dorothy and Henry Kraus were adamant in their choice of what to repair and what to replace. No carved pieces were to be modernized or repaired in any way, except for consolidation of split wood. Only the structural, nondecorated parts could be replaced.

But because so many of the original 80 stalls were missing, the 20 or so that could be salvaged had to be cobbled together from bits and pieces.

This is where the Krauses' catalog of stall art became vital. Ranging throughout Spain, they had surveyed every example of the medieval carver's art they could. They sought a rationale for the restoration, for associating certain themes and ecclesiastical figures.

Most of the Oviedo carvings were finished within a decade of Columbus' discovery of America and they reflect the primary social currents of that expansive age. So you can detect typical church iconography. St. James, for example, the patron saint of Spain, is shown with his scallop shell, symbolic of the pilgrimage to Compostela.

But there are intimations of Moorish life here as well, despite the great Reconquista against the Moors. It is not unusual to see Moorish dancers (a term that apparently evolved into the Morris dancers of northern Europe).

Jewish life, too, is well represented. For in church art the Old Testament was regarded as prefiguring New Testament history. Isaac, for example, fetching wood for his sacrificial fire carries it as two crossed beams—surely this is a Christlike figure.

It is a comforting thought: Jewish, Christian, Islamic life, together in

church art. For centuries before the Inquisition and the rise of the Berbers in Islam, these three creeds lived together in peace and harmony in Spain, and fashioned there as sophisticated and advanced a civilization as the world has ever seen. And although something—many things—went terribly wrong, the pale fire of that great age still glows in this art. It was good of the Krauses to bring it to our attention.

Michael Olmert
Writer, *Smithsonian World*

Brain Matters: Stories of a Neurologist and His Patients
Bruce H. Dobkin
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Consider the dilemma of Bruce Dobkin, neurologist. Dobkin has made it: he has a wife, healthy twin daughters and a busy neurology practice in Los Angeles.

Yet he dashes like a bizarre juggler from a stroke victim with a dangerously swelling brain to a young man with rapidly advancing paralysis to an assortment of less complicated cases—from disaster to disaster he goes, heavy with the knowledge that while he can help at times, "Nothing yet heals brain injuries with even occasional success."

Dobkin watches a fellow physician—whose wife suffered brain damage in a scuba-diving accident—resort to meditation and telepathy to try to help her. And by a cruel blow of fate, Dobkin sees his own father succumb to an incurable brain tumor. No wonder he takes pen in hand to draw sense from his experiences.

In *Brain Matters* we follow five of Dobkin's major cases, and several short-term cases, until the patients are cured, rehabilitated or come to tragic endings—of which there are many in neurology. They suffer from Alzheimer's disease (progressive dementia), Parkinson's disease, strokes, Lou Gehrig's disease (amyotrophic lateral sclerosis), complications of alcoholism, tumors, epilepsy and others of the disorders—caused by trauma, toxins, disease, genetics—that may occur along the neurological pathways from brain to toes. Dobkin writes in a plain, functional style, although he portrays his patients with a close-up light that evokes the reader's sympathy as their destinies unfold.

A newcomer to practice at the time of some of these cases, Dobkin also examines himself close up. Faced with responsibility to every stranger who walks through his door, he laments the pass-

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ing of his carefree student days and confesses to times when he just wants to stay in bed. He is impatient with some of his strange, cranky patients; he errs in diagnoses and he shies from emotional contact with those who are suffering. He must learn to look them in the eye and hold their hands. His patients teach him to do that.

Naturally, we also see him at finer moments, using the elegant thought processes required for a difficult diagnosis. In one instance, a woman complains she has been dizzy for a week and compares it to how she felt when her best friend died several years before. Since her husband has just died, her internist thinks she is depressed. But the observation that she walks with her feet farther apart than usual leads the neurologist to the answer. "It was a subtle finding in a woman her age, and I had to convince myself that it might have meaning." Six years before, she had had breast cancer. "That bit of history plus her gait led me to order a CT scan, just to be thorough." She has a brain tumor.

Another woman arrives in his office with a deluge of complaints that include headaches, neck pain, "little tingling feelings" and so on. As the examination progresses, the woman confesses that she has done some "dumb things." Once, she has been told, she took off her underwear when visiting friends and stuffed it under a sofa. She does not recall the incident or other bizarre behavior.

Dobkin is suddenly very interested and asks further questions. Her husband reports that she sometimes stares blankly for a few minutes, smacking her lips and brushing at her chest, and once he thought her breathing had stopped. Dobkin realizes that she is not a hypochondriac: she has epilepsy.

On the lighter side, for example, a barber who is cutting the doctor's hair stops to snort, curse and jam her elbows into her ribs. She then resumes trimming his sideburns. Dobkin recognizes a neurological disorder and suggests she might see a specialist.

But beyond doctor, patients and disease, glowing from the core of this book is the brain itself, and the occasional glimpses we get of this majestic, infinitely complex organ are enough to stir wonder and gratitude that most of the time it all works so well. The book would have been richer with more detailed glimpses of the brain, and readers interested in the subject may prefer neurolo-

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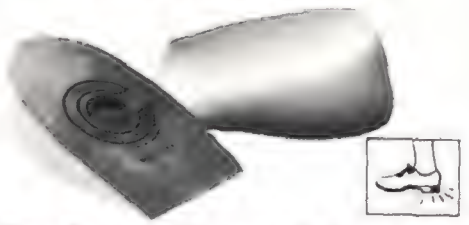

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gist Richard Restak's excellent works. Another writing neurologist, Oliver Sacks, who is the author of *The Man Who Mistook His Wife for a Hat* and other classics, remains the master of the neurological case history. Dobkin, however, has accomplished what he set out to do: he provides a fine introduction to the realm of the neurologist.

Carol Eron
Author of *The Virus That Ate Cannibals*

Writers at Work: The Paris Review Interviews
Edited by George Plimpton
Viking, $22.95

It's simply untrue that only taxes, death and the rose of Sharon endure. At 33 years (an eternity for a literary magazine) *The Paris Review* gives every indication, like the fabled flower, of flourishing.

A core feature of the magazine, founded in 1953, has been the interview, an intimate look at a writer's craft. A kind of imprimatur of substantial attainment, a magazines' Nobel, this is the seventh volume collected (including the first, which was edited and introduced by Malcolm Crowley in 1957).

How fitting that Crowley, our reigning literary chronicler, leads off this collection. His memories, which virtually span the century, are honest, funny, revealing and compassionate, making him (often to his regret) a "national scholarly resource." There are 12 other writers interviewed here. Noted foreign litterateurs Eugène Ionesco, Arthur Koestler, Milan Kundera, Edna O'Brien and Philip Larkin make it seem like a PEN International gathering. Both Koestler and Larkin have died, but scholars long will plumb these interviews for insights into their personalities.

The intensely individualistic Larkin, a poet who worked diligently as a librarian in provincial England, was, surprisingly, a noted jazz authority. Never, in any endeavor, a bandwagoner, Larkin could dismiss the legendary modernist Charlie Parker thusly: he "wrecked jazz by—or so they tell me—using the chromatic rather than the diatonic scale. The diatonic scale is what you use if you want to write a national anthem, or a love song, or a lullaby. The chromatic scale is what you use to give the effect of drinking a quinine martini and having an enema simultaneously."

There are enough entertaining observations to keep the reader warm through the Ides of March. Listen to John Ashbery, perhaps America's most difficult poet. "I

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often wonder if I am suffering from some mental dysfunction because of how weird and baffling my poetry seems to so many people and sometimes to me too." That "sometimes to me too" will encourage his readers and is characteristic of these interviews, often conducted over a long period of time by questioners familiar with the writer's oeuvre. Personal asides and a human touch personify these "talks with" (even a few conducted by way of lengthy correspondence) and demonstrate a writer's modus operandi.

Writers at Work can be appreciated on many levels. Taking its title literally may be the best approach. If any aspiring writers out there think the craft, or the life, is more ecstasy than agony, they had better read carefully. The rewards, nonetheless, for those who persevere are apparently worth it. Edna O'Brien, remembering the tragedies and suicides of writers, can still affirm that "Literature is the next best thing to God." But the work must still be done.

Raymond Carver, who writes poems and prose, has "done as many as twenty or thirty drafts of a story. Never less than ten or twelve drafts." Or, later, talking about his poems, "It's the same with the poems, only the poems may go through forty or fifty drafts. Donald Hall told me he sometimes writes a hundred or so drafts of his poems. Can you imagine?"

Persistence, survival and commitment exemplify the careers of writers interviewed in this and the six previous collections all edited (with the exception of the first) by George Plimpton. A prime example is Philip Roth's looking for a "liveliness to set the tone." He remembers full working days over a period of six months that might result in one page of sentences that he likes to keep. But, as he says, "if I'm lucky, that's the start of page one."

In a time of facile celebrity and all-too-easy books, it is sobering to experience *Writers at Work*. In itself, the book becomes an experiment in learning. John Updike, in a sagacious, typically excellent introduction, concludes that "As the gods recede, the distances between the artist and the other tribal members grow greater, and to lessen the distance, perhaps, interviews like these are sought and, however uneasily, granted."

William Claire
Washington poet and founding editor and publisher of the literary magazine *Voyages* (1967-73)

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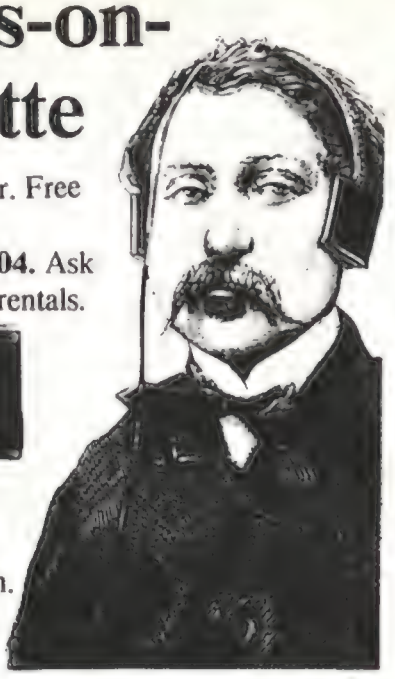

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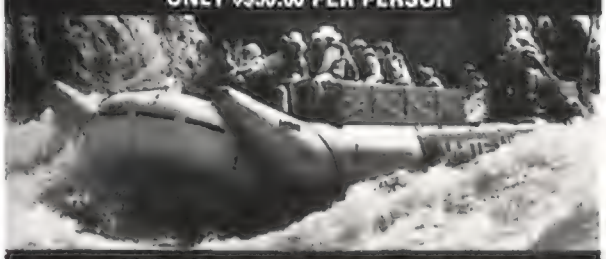

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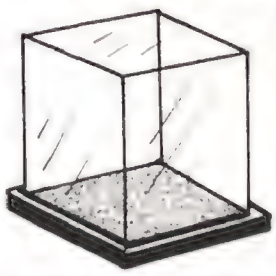

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Additional reading

Phenomena (p. 30)

The Tell-Tale Eye: How Your Eyes Reveal Hidden Thoughts and Emotions by Eckhard H. Hess, Van Nostrand Reinhold, 1975

The Naked Ape by Desmond Morris, Dell Publishing, 1967

Men and Pandas by Ramona and Desmond Morris, Hutchinson & Co. (London), 1966

Blackout (p. 38)

"What Went Wrong? Something Called 345 KV" by Theodore H. White, and "The Big City Lived by the Light of the Moon," *Life*, November 19, 1965

"Operating a Major Electric Utility Today" by Theodore J. Nagel, *Science*, September 15, 1978

"The Value of Reliability" by John Douglas, *EPRI Journal*, Electric Power Research Institute (Washington, D.C.), March 1986

"Blackout Looting" by Robert Curvin and Bruce Porter, *Society*, May/June 1979

1985 System Disturbances by the North American Electric Reliability Council (Princeton, New Jersey), 1986

Serengeti (p. 50)

The Last Place on Earth by Harold T. P. Hayes, Stein and Day, 1977

Serengeti: Dynamics of an Ecosystem by A. R. E. Sinclair and M. Norton-Griffiths, University of Chicago Press, 1979

The Serengeti Lion by George B. Schaller, University of Chicago Press, 1972

Portraits in the Wild: Animal Behavior in East Africa by Cynthia Moss, University of Chicago Press, 1982

The Long African Day by Norman Myers, Macmillan, 1972

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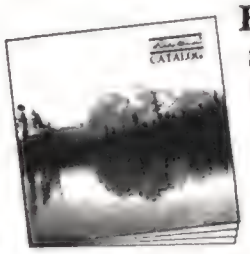

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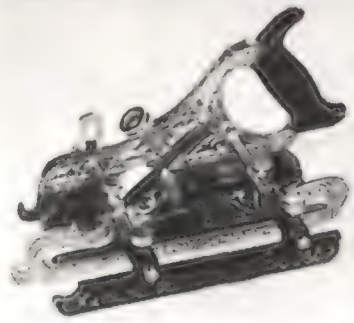

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Paul Klee (p. 64)

Paul Klee (exhibition catalog), edited by Carolyn Lanchner, Museum of Modern Art, Little, Brown, 1987

Paul Klee: The Colored Works in the Kunstmuseum Bern by Jürgen Glaesemer, Kornfeld (Bern, Switzerland), 1979

Paul Klee: Life and Work by Christian Geelhaar, Barrons (Woodbury, New York), 1982

Paul Klee: The Thinking Eye by Paul Klee (notebook, Vol. 1), George Wittenborn (New York), 1964

Paul Klee: Art & Music by Andrew Kagan, Cornell University Press, 1983

Willard Hotel (p. 78)

The Willard Hotel: An Illustrated History by Richard Wallace and Marie Pinak Carr, Dicmar Publishing Company (Washington, D.C.), 1986

"The Willard Hotels of Washington, D.C., 1847-1968" by Dean R. Montgomery, *Records of the Columbia Historical Society of Washington, D.C.*, 1966-68

Willard's of Washington: The Epic of a Capital Caravansary by Garnett Laidlaw Eskew, Coward-McCann, 1954

Avenue of the Presidents by Mary Cable, Houghton Mifflin, 1969

Laser art (p. 118)

"Laser Light on Film" by King Dexter, *Petersen's Photographic*, January 1986

"A Master Apprenticeship" by King Dexter, *Darkroom Photography*, December 1986

"The Adams Environment" by Amy Shiffman, *American Photographer*, July 1984

Triskaidekaphobia (p. 122)

"First Annual and Thirteenth Regular Meeting of The Thirteen Club," January 13, 1883, The Thirteen Club (New York)

Numberpower: In Nature, Art, and Everyday Life by Keith Ellis, St. Martin's Press, 1978

Hosting (p. 152)

Don Juan by Lord Byron, Houghton Mifflin, 1958

Savoring the Past: The French Kitchen and Table from 1300 to 1789 by Barbara Ketcham Wheaton, University of Pennsylvania Press, 1983

Eating in America: A History by Waverly Root and Richard de Rochemont, Ecco Press (New York), 1976

Alexandre Dumas' Dictionary of Cuisine, edited and translated by Louis Colman, Simon and Schuster, 1958

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National Museum of American Art
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National Museum of American History
Field to Factory: Afro-American Migration, 1915-1940 (February 5-February 1988) Photographs and documents, a tenant farmhouse, plows and other tools.

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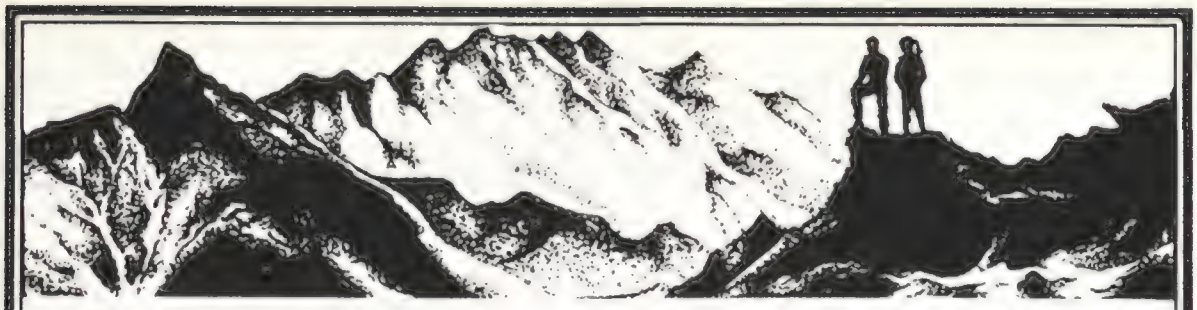

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Cooper-Hewitt Museum (New York)
Folding Fans from the Cooper-Hewitt Collection (February 3-May 31) A history of the folding fan from the late 17th century through the 20th.
Gaudi in Context: Building in Barcelona, 1873-1926 (February 17-June 9) Includes 75 objects and 75 works on paper.

National Portrait Gallery
Recent Acquisitions (February 7-August 9) Paintings, sculptures, prints, photographs.

National Museum of Natural History
American Bird Sculpture: Decoys to Decoratives (through April 30) One hundred carvings from the collection of the North American Waterfowl Art Museum in Salisbury, Maryland.
The Making of A Dinosaur (opens February 12; runs indefinitely) In public view, technicians remove Coelophysis remains from a ten-ton block that was excavated in New Mexico.
Portraits of Nature: Paintings by Robert Bateman (through May 17) One hundred paintings by Canadian wildlife artist.
Lions of the African Night (February 13, noon; Baird Auditorium) New National Geographic Society offering.

National Air and Space Museum
Flight of the Valkyrie: The XB-70 (February 19; 7:30 P.M.) Lecture by test pilot Alvin S. White.
Sky Shooting (February 7; 9:30 A.M.) Monthly sky lecture by astronomy photographer Geoffrey Chester.

Other February events

Musical Weekend

Highlights of the 15th Musical Weekend, May 1-3, will include the Smithsonian Chamber Players in concert using authentic period instruments; the National Symphony Orchestra with Kathleen Battle as soloist, and dinners in the Arts and Industries Building and the Renwick Gallery. For further information, write: Musical Weekend, Room 4124 NMAH, Smithsonian Institution, Washington, D.C. 20560.

Contributing Membership Program

The Contributing Membership supports the Institution's work in education, research and scholarship. Membership categories are: Supporting, $60 (available only to non-Washington, D.C.-area resi-

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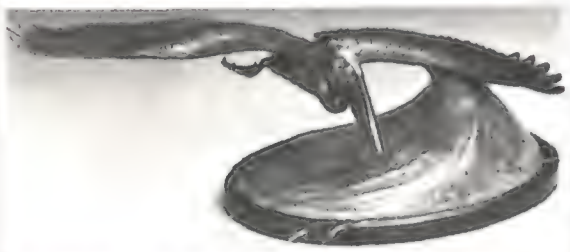

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Nancy Graves' sculptures go on exhibit at the Hirshhorn Museum, February 19.

dents); Donor, $125; Sponsoring, $300; Sustaining, $600; Patron, $1,200; and James Smithson Society, $2,000. (Contributions are tax-deductible within legal limits.) In addition to all benefits of Smithsonian Associates, Contributing Members enjoy special privileges, such as Smithsonian publications, evening receptions and previews of museum exhibitions, the annual Smithsonian Engagement Calendar, Resident Associate membership (Washington, D.C.-area residents only) and advance notice of and complimentary tickets for Lecture and Seminar Program activities in their area. For more information, write the Contributing Membership Program, Smithsonian, Washington, D.C. 20560.

Resident Associate Program

To become a Resident Associate, or to find out about the many other activities presented monthly, or for fee and ticket information, call 357-3030. Here are some February events:

Seamus Heaney: Poetry Reading (February 1; 7:30 P.M.) Readings by Ireland's most famous poet.

The Hornes: An American Family (February 9; 8 P.M.) Author Gail Lumet Buckley highlights Black History Month with lecture about her family.

Nicholas Gage's Portrait of Greece (February 19; 8 P.M.) Author introduces his new book, *Hellas: A Portrait of Greece.*

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Senator John Glenn Commemorates the 25th Anniversary of the Flight of Friendship 7 (February 25; 8 P.M.) Reminiscence, accompanied by rare NASA film footage.

Smithsonian on the air

Radio Smithsonian: Features on this weekly half-hour series include two American masters of music—Roberta Peters and Dizzy Gillespie.
Smithsonian Galaxy: Short radio features.
Here at the Smithsonian: Short TV features go behind the scenes.

To find out what stations in your area carry these programs, write: Office of Telecommunications, NMAH Room BB40, Washington, D.C. 20560.

Exhibition catalogs

Catalogs available at this time include:
Engines of Change, The American Industrial Revolution, 1790-1860 (cloth, $39.95; paper, $19.95)
Engines of Change (booklet; paper, $5.95)
Mountain Light, In Search of the Dynamic Landscape (cloth, $35)
Portraits of Nature, Paintings of Robert Bateman (paper, $17.50)
Modern American Realism, The Sara Roby Foundation Collection (paper, $16.95)
Nancy Graves, A Sculpture Retrospective (paper, $25)
Wildfowl Art (paper, $5)

To order, send check or money order to Museum Shops, Box 44083, Washington, D.C. 20026-0083. Include 15 percent of total purchase to cover postage and handling (minimum, $1.75).

Smithsonian Institution Traveling Exhibition Service

SITES circulates exhibitions to hundreds of cities outside Washington. To sponsor a show in your community, write SITES, Smithsonian, Washington, D.C. 20560. Here are some February exhibits:
Denver (February 7-March 22) *Hooray for Yiddish Theater in America!*, Mizel Museum of Judaica.
Shreveport, Louisiana (February 21-March 22) *After the Revolution: Everyday Life in America, 1780-1800*, Meadows Museum of Art.
Statesboro, Georgia (February 14-March 15) *Baseball Immortals: The Photographs of Charles Martin Conlon, 1905-1935*, Georgia Southern College Museum.
Suitland, Maryland (February 14-March 5) *Vietnam Veterans Memorial: A National Experience*, Airman Memorial Museum.
See *Highlights continued.*

"Tulip Time in Holland"

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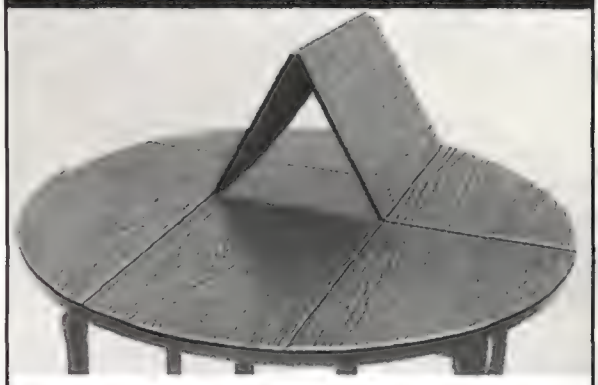

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Highlights continued

Reflections on 'the wall'

The Vietnam Veterans Memorial—a 250-foot-long black granite wall that sinks into the Mall's grassy expanse in Washington, D.C.—bears the names of the almost 60,000 men and women who died or remain missing in Southeast Asia. Since "the wall" was dedicated in 1982, people have come from throughout the country to find the name of their lost son, husband or friend, and to try to get a grip on what it all meant. Volunteers with thick directories, some of them Vietnam vets themselves, provide on request the panel and line where a specific name can be found. It takes many people several visits before they can find the heart to ask.

Smithsonian staff photographers have documented the memorial, and now 70 of their photographs have been organized into an exhibit by three units of the Smithsonian—SITES, the Office of Printing and Photographic Services, and the Division of Armed Forces History at NMAH. The show, traveling under SITES, opens at the Airman Memorial Museum in Suitland, Maryland, on February 14. A companion book, *Reflections on the Wall: The Vietnam Veterans Memorial* (Stackpole), will be available in bookstores sometime this month.
Constance Bond

In picture taken by Jeff Ploskonka, a boy watches 1984 candlelight ceremony.

Veterans make a rubbing of a comrade's name; photograph is by Jeff Tinsley.

Grief, 1982, by Richard Hofmeister: a woman touches a name on the wall.

Dane Penland recorded World War I veteran Joe Ambrose saluting Vietnam veterans.

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Domestic Study Tours

Genius of Matisse March 12-14: With the National Gallery's blockbuster exhibition as centerpiece, enjoy a special weekend program on this 20th-century master.

Okefenokee and Suwannee River April 4-11: Canoe and camp in this wilderness sanctuary for millions of singing creatures.

Big Bend April 14-23: Hike the spectacular canyon trails in this southwestern Texas wilderness park.

Delta Queen April 16-24: Take a steamboat journey into America's past on the lower Mississippi from New Orleans to Memphis.

National Air and Space Weekend May 1-3: Explore the past, present and future of air and space travel through special tours and lectures at NASM and its facilities.

New York Architecture—From Cast-Iron to Post-Modern May 14-17: Enjoy a weekend of walking tours, theater and a private cruise around Manhattan.

New England and Hudson River Cruise May 30-June 13: Aboard the *Newport Clipper*, sail from Boston to New York. Visit West Point, Nantucket and Newport, featuring an elegant dinner at the Vanderbilts' Marble House.

Bryce, Zion and the North Rim of the Grand Canyon June 4-14 and August 31-September 10: Hike canyon trails to admire foliage, wildlife and geological history.

Chicago June 10-14: Walking tours and special programs to study the city's stunning architectural legacies.

Civil War—the Eastern Theater June 18-28: Beginning in Washington, D.C., travel to Richmond, the Shenandoah Valley and Gettysburg to retrace the events of the war.

Grand Canyon July 3-13: View magnificent landscape while rafting down the Colorado River with expert boatmen.

Sojourn Santa Fe July 19-26: Settle in for a leisurely exploration of the area's pueblo villages and scenic sites.

Alaska's Interior August 6-17: Watch bears and caribou while hiking in Denali National Park; float down the Kenai River and meet Eskimo artists in Nome.

Lewis & Clark Trail August 8-15: Enjoy Idaho's spectacular wilderness scenery as you follow portions of the overland 1805 trail by horse and vehicle.

Alaska's Inside Passage August 18-25: Informal cruise from Ketchikan to view wildlife and glaciers at close range.

Washington "Anytime" Weekend Discover your capital city in Smithsonian style with this convenient and economical two-night package. Be sure to visit the Matisse show, now through March 29. Reserve by phone with your Visa or MasterCard.

Foreign Study Tours

Voyage to the Islands of the South Pacific February 21-March 10: Aboard the *Illiria*, travel from New Guinea to Fiji. Observe diverse cultures and traditional art; enjoy striking natural beauty.

The Valley of Mexico and El Tajín March 13-25: Sample rich, diverse cultures in and around Mexico City and Veracruz.

Kyoto Seminar March 14-29: Live Japanese-style. Field trips complement lectures on art, history, religion and language.

Sail the Pacific—a Smithsonian First! March 19-April 11: Sail aboard the tall ship *Sea Cloud* through the Panama Canal to the Galápagos and on to Easter Island.

Guatemala Adventure March 26-April 6: Explore distinct Maya civilizations from the highlands to the monumental cities of Tikal and Uaxactún in the Petén jungle.

People's Republic of China Nine unique itineraries beginning in April. Hike, travel by train, study decorative arts, visit Nepal and Tibet . . . tours for first-time and repeat China travelers.

Wales April 30-May 14: Residents offer you a very personal exploration of the unique Welsh landscape and culture with emphasis on literature and the arts.

Countryside Programs May to September: Explore scenic and historic areas in Hungary, England, Austria, France or Switzerland.

Malaysia, Borneo and Singapore May 9-27: Explore Kuala Lumpur, Malacca, Sarawak and more—for 19 days of color, culture and camaraderie.

Shadows of the Past—Chateaus, Caves and Villages of the Dordogne May 9-23, September 12-26: Explore this fascinating region of France. Tour includes four days in Paris.

Irish Walk May 15-27 or September 24-October 5: Take day hikes through a variety of settings in the Ring of Kerry and Connemara.

Odyssey of Flight June 3-15: An aviation tour of England and France. See the world's finest aviation museums and flying demonstrations. Includes the Paris air show.

Wild Highlands of Scotland June 4-22: Enjoy the outdoors while studying this area's cultural and natural history.

Trans-Siberia June 18-July 9: Journey by rail across Siberia from east to west, then choose from excursions to Outer Mongolia, Central Asia or the Caucasus Republics.

Lake Country Hikes June 19-July 3: Hike and explore this corner of England so beloved by writers and artists.

Montreal/Quebec July 7-18: Experience the charm and hospitality of France in the New World.

Finnish Summer July 11-26: Attend the Savonlinna Opera Festival, then explore southeastern Finland with its spectacular scenery, castles and museums.

Scotland by Train July 11-26: Travel by steam trains and coastal steamers from Edinburgh and Inverness to the wild highlands, mountain lochs, Skye and Glasgow.

Iceland July 25-August 9: An adventure tour that circles this austere, beautiful land. Study unique geology, see fascinating plant and bird life.

Write Smithsonian National Associates, 1100 Jefferson Drive, SW, Washington, DC 20560 or call (202) 357-4700 for tour brochures

in Washington

Smithsonian Seminars

Travel to Wisconsin this spring for specially arranged Smithsonian seminars at the EAA Aviation Center in Oshkosh and the University of Wisconsin in Madison. Join your fellow Associates, Smithsonian curators and other distinguished faculty for stimulating programs that focus on air and space science, biological diversity and native American history. Hotel accommodations for all seminars are optional.

EAA Aviation Center, Oshkosh
April 24-26

Aviation History, Technology and Restoration

Enjoy lectures by Smithsonian curators on the history of aviation and aircraft technology and participate in airplane restoration sessions where you'll see professional welding, woodworking, fabric and metalwork techniques at the home of Oshkosh's world-famous annual Fly-In.

University of Wisconsin-Madison
May 28-31

Native Americans in U.S. History

Trace the history of Anglo-Indian relations in America from the early contact period through the creation of the Bureau of Indian Affairs. Learn about native Americans in the Civil War era, the Indian wars of the 1860s and 1870s, the establishment of reservations and today's self-determination movements. The seminar includes a visit to the nearby Oneida Nation Museum.

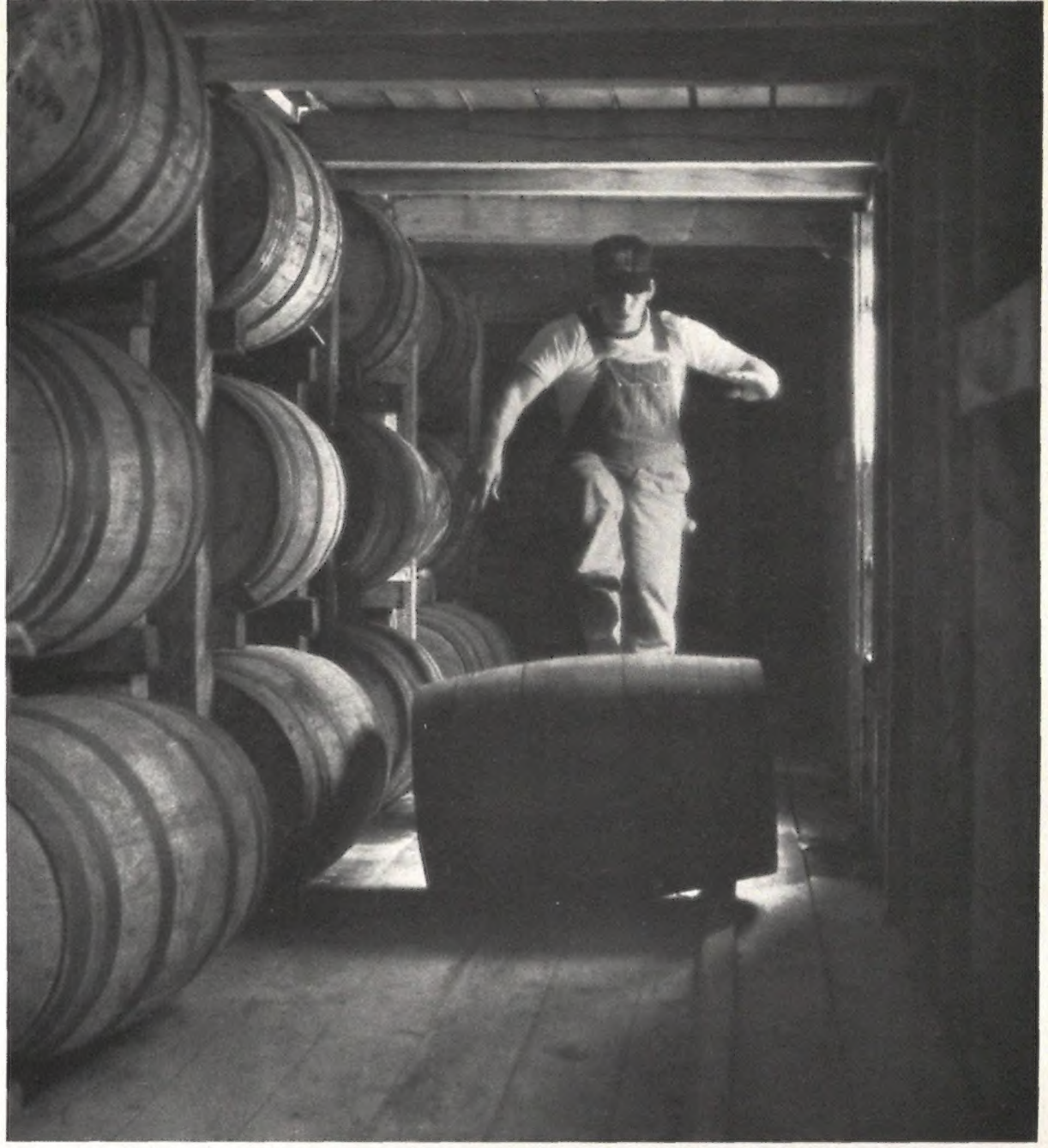
BioDiversity: Challenge in the Natural World

Explore the dramatic diversity of the Earth's biological resources and learn about current measures designed to halt the threat of extinction among endangered plant and animal species. Field trips to the International Crane Foundation and local ecological habitats are included.

Exploration in Space: Recent Past and Near Future

Learn about America's early satellite projects, lunar and planetary exploration, future space shuttle missions and plans for space stations of the 1990s during lectures, films and discussions with Air and Space Museum curators. Go behind the scenes at the University's Space Science Department where experts will acquaint you with current aerospace research projects.

or (202) 357-1350 for seminar brochures.



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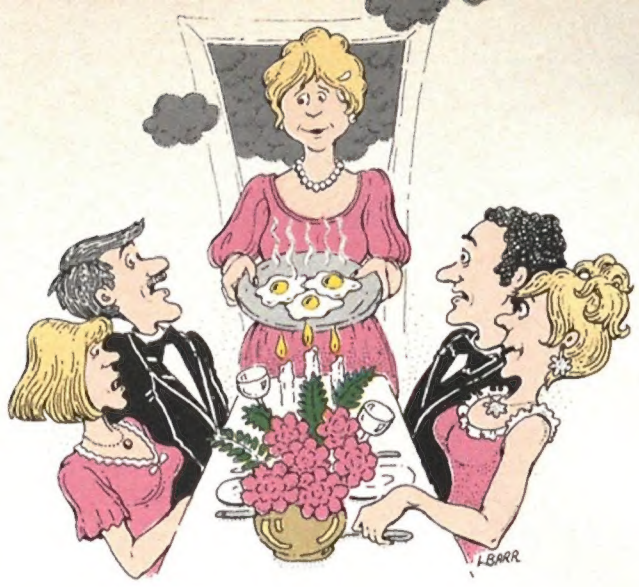
By Susan Dooley

And after all, isn't that what eggs are for?



"That all-softening, overpowering knell,/ The Tocsin of the Soul—the dinner-bell," Lord Byron wrote at a moment when he and his Muse were contemplating beef instead of beauty.

Simple lines, but their inclusion in *Don Juan* alerts the careful reader to the fact that Lord Byron, mad though he may have been, bad though he may have been, was born to be a guest. The bell that knelled for Lord Byron was telling him to tuck his toes under someone else's dining-room table.

And the reason the careful reader knows this is that no host could possibly write with such hopeful equanimity about the approach of dinner. In fact, the host/hostess has no time to write, being busy in the kitchen peeling this or that, or down on hands and knees poking around behind the sideboard to see if the missing knives, forks or spoons have lodged there. (Pointless, of course, since anyone who entertains with any regularity knows that the knives have been cleared away into the garbage bin by a helpful guest and the spoons have been ground up in the disposal.)

If the doorbell were to ring and a worried host should find one of the lovely Muses on the doorstep, she would probably be sent away for fear of unbalancing the table.

The world's most famous worried host, as well as the patron saint of nervous party givers, is Vatel, maître d'hôtel to the Prince de Condé, who, when he feared he would not have enough fish to feed King Louis XIV and his court (of some 5,000), ran himself through with his sword. "They knocked, they broke down the door, they found him drowned in his own blood," gossipy Madame de Sévigné wrote of the dramatic death of the man who actually did what others of us have simply threatened to do.

Vatel took the easy way out; the rest of us must live to serve another day knowing that even as we rise to the occasion, the soufflé will fall.

Anyone who spends more time on the cuisine than the conversation makes guests nervous. They get an uneasy feeling they are intruding upon a Grand Passion between Man and Mayonnaise. People who entertain should resign themselves to the fact that at some point in life the roast will burn. After all, isn't that what eggs are for? Anyhow, a ruined dinner is no bar to greatness. George Washington's pet hound, Vulcan, once snatched an entire ham off the table just as the Father of Our Country was about to call the guests in to eat.

Guests are also better at coping with a culinary hitch than hosts give them credit for. Woodrow Wilson, in many ways a stiff academic, deftly extricated himself (and a royal dinner) from a pit of protocol created by an absence of asparagus. On a visit to Italy, he had been instructed that custom decreed he must toast the King and Queen immediately after the asparagus had been served. No one had thought to inform him that on that morning the market had failed to yield a single spear. As the dinner tottered to an end and diplomatic disaster drew near, Wilson had the good sense to rise and inquire of the royal pair whether Italian custom also included serving asparagus after the ice cream.

The more elaborate the entertainment, the more likely that things will go wrong. Catherine de Médicis, having built a dining pavilion on an island and dressed up her serving women as shepherdesses, learned that "envious fortune could not bear the glory, and brought on a strange tempestuous rainstorm." In other words, the Queen, whose entertainment credits seem to include introducing the fork instead of the finger as the utensil of choice, had no better luck than the rest of us; she got rained out.

Even when it doesn't rain, the attempt to create a pastoral idyll is a trap that has ensnared many a host. Guests occasionally misbehave; animals always do. A gentleman of New York's Gilded Age, one Edward Luckmeyer, built a caged canal down the middle of his banquet table, filled it and set four swans afloat upon it—but, as it soon turned out, four swans in their mating season.

It is difficult to ignore swans a-mating, yet clearly one key to hostly equanimity is to think of your dinner as a performance (that may include the Marx Brothers) and act as though anything that does happen was meant to happen.

There is a whole genre of encouraging stories about servers dropping the fish/fowl/roast only to have the imperturbable host/hostess call out, "Serve the other fish/fowl/roast!" The original, though, concerns two enormous sturgeons given to a rich archgourmand named Cambacérès, in the time of Napoleon I. One sturgeon weighed 374 pounds, the other 324. "If both were served at the same dinner," wrote Alexandre Dumas, who recounted the incident, "one would evidently belittle the other. On the other hand, it was unthinkable to serve two fish of the same variety on succeeding days." Cambacérès accordingly had the smaller sturgeon cooked and decked out with flowers to be paraded around the dining room to admiring "Oohs!" and "Aahs!" from the guests. Then a bearer stumbled, the huge fish crashed to the floor and a cry of despair arose from the crowd. But over the tumult came Cambacérès' voice thundering, "Serve the other!"

This disaster had, in fact, been carefully planned for full effect. The rest of us must take what comes.

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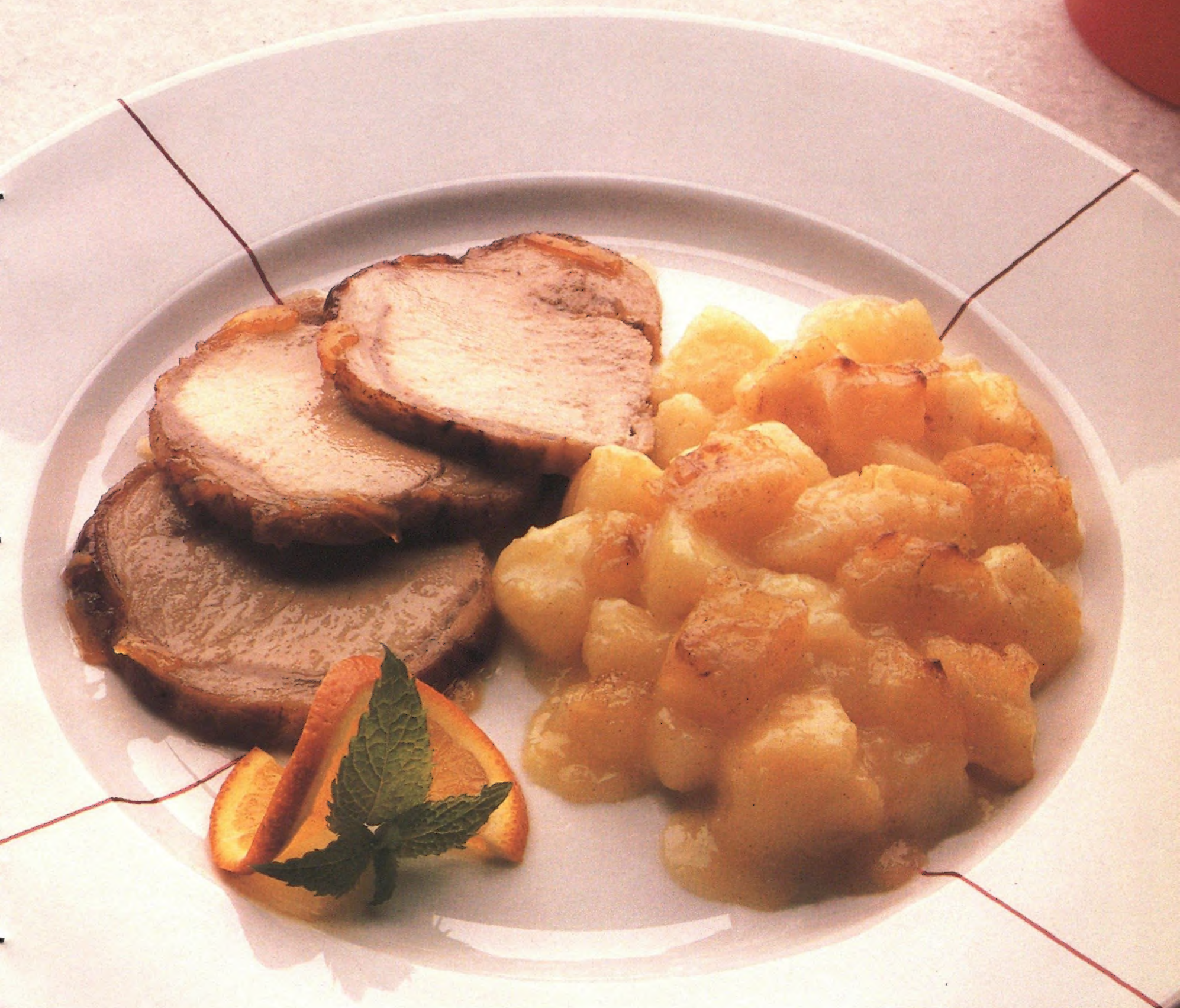

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George Schaller

Snow leopards in the Himalayas. Tigers in the wilds of India. Mountain gorillas and lions in Africa. Jaguars in the swamps of Brazil.

George Schaller, pictured here with a snow leopard, has spent years in remote and rugged places studying the natural history of rare animals—and fighting for their survival.

He sees these animals as symbols of the habitats in which they live. Preserve their habitats and thousands of other plants and animals will be assured of a home.

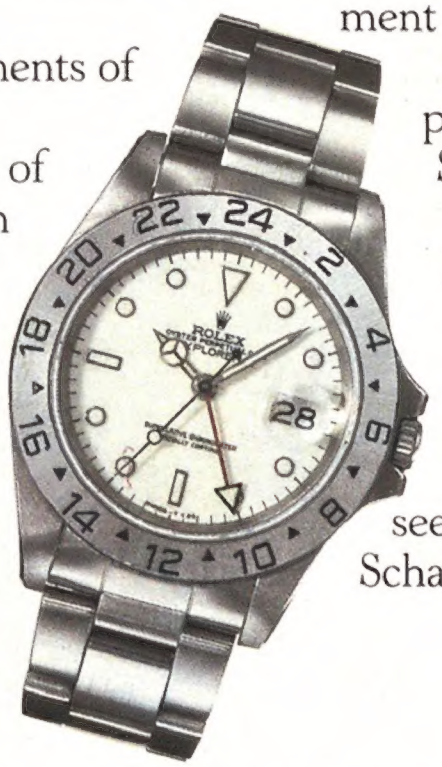
As director of Wildlife Conservation International, a division of the New York Zoological Society, Schaller and the staff have helped establish more than 50 reserves around the world.

One of the 1000 remaining giant pandas.

He points out that the destruction of environments is now so drastic that, in the decades ahead, the nature of life on earth will be irrevocably changed.

For Schaller, saving fragments of nature is an urgent task.

Recently he faced one of his greatest challenges. With Chinese scientists, he collaborated in a project to save the 1000 giant pandas still alive in the wild. Currently he is working on the Tibetan plateau to help preserve the wildlife of those remote uplands.



Since his work takes him to some of the most forbidding places on earth, choosing the right equipment is crucial. Not surprisingly, Schaller wears a Rolex.

China: Site of panda rescue mission.

"My watch must be absolutely reliable, as animal observations are recorded under the most demanding conditions. My Rolex has never let me down."

Inhospitable conditions seem to pose no problem for George Schaller. Or his Rolex.

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